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ABSTRACTS

Berg, Ina, X-Radiography of Knossian Bronze Age Vessels: Assessing our Knowledge of Primary Forming Techniques

This article investigates the potential of X-radiography for identifying primary forming techniques of Cretan Bronze Age vessels. X-radiography of 95 EM III through to LM II vessels from Knossos has now demonstrated its suitability for fine, semicoarse and coarse Cretan fabrics. In several cases, it has been possible to rectify erroneous attributions based on visual inspection alone and to provide more specific details of the diversity and development of past forming techniques.

Ραδιογραφία ακτίνων-Χ σε Κνωσιακά αγγεία της Εποχής του Χαλκού: Αξιολογώντας τη γνώση μας σχετικά με τις βασικές τεχνικές κατασκευής

Στο άρθρο αυτό εξετάζονται οι δυνατότητες της ραδιογραφίας ακτίνων-Χ στην αναγνώριση βασικών τεχνικών κατασκευής των κρητικών αγγείων της Εποχής του Χαλκού. Η ακτινογράφηση ενενήντα πέντε ΠΜ ΙΙΙ έως και ΥΜ ΙΙ αγγείων από την Κνωσό, χρονολογούμενων από την ΠΜ ΙΙΙ έως την ΥΜ ΙΙ, απέδειξε την καταλληλότητά της τεχνικής αυτής για την εξέταση της κρητικής λεπτής, ημιχονδροειδούς και χονδροειδούς κεραμικής. Σε αρκετές περιπτώσεις, κατέστη δυνατόν να διορθωθούν εσφαλμένα συμπεράσματα, που είχαν βασιστεί αποκλειστικά σε οπτική παρατήρηση, και να διευκρινιστούν καλύτερα συγκρεκριμενες περισσότερο οι ακριβείς λεπτομέρειες ως προς την ποικιλία και την εξέλιξη των παλαιών τεχνικών κατασκευής.

Bouwman, A.S., Brown, K.A., Brown, T.A., Chilvers, E.R., Arnott, R., and Prag, A.J.N.W., Kinship in Aegean Prehistory? Ancient DNA in Human Bones from mainland Greece and Crete

Attempts were made to detect ancient DNA (aDNA) in samples of 89 human skeletons from Neolithic and Bronze Age sites in Greece and Crete. Ancient DNA was absent in specimens from Nea Nicomedia, Lerna, Kato Zakro: Karaviádena, and Mycenae Grave Circle A. For each of three skeletons sampled from Antron Grave Circle B, polymerase chain reactions (PCRs) gave products for nuclear but not mitochondrial DNA, but the yield of DNA was low and inconsistent, with replicate PCRs failing to give reproducible results. At Kouphovouno evidence for mitochondrial and/or nuclear aDNA was obtained from eight of the 20 skeletons that were examined, while at Mycenae Grave Circle B evidence for mitochondrial aDNA was obtained for four of the 22 skeletons that were studied, and in two cases confirmed the evidence of close kinship that had already been suggested by facial reconstruction: this in turn raises interesting questions of social relationships and the role of high-status women in MBA/LBA society. We conclude that, although aDNA might be present in some Eastern Mediterranean skeletons from later centuries of the Bronze Age, it is not commonly found in material from this period and is likely to be absent from older material.

Συγγένεια στην Αιγαιακή Προϊστορία; Αρχαίο DNA σε ανθρώπινα οστά από την Ηπειρωτική Ελλάδα και την Κρήτη.

Στη μελέτη αυτή έγιναν προσπάθειες να αναγνωριστεί αρχαίο DNA (aDNA) σε δείγματα ογδόντα εννέα ανθρώπινων σκελετών προερχομένων από θέσεις της Νεολιθικής περιόδου και της Εποχής του Χαλκού στην Ελλάδα και την Κρήτη. Αρχαίο DNA δεν εντοπίστηκε σε δείγματα από τη Νέα Νικομήδεια, τη Λέρνα, την Κάτω Ζάκρο (Καραβιάδενα) και τον Ταφικό Κύκλο Α των Μυκηνών. Για κάθε έναν από τους τρεις σκελετούς, οι οποίοι εξετάστηκαν από τον Ταφικό Κύκλο Β της Αντρώνας, οι αλυσιδωτές αντιδράσεις πολυμεράσης

(PCRs) απέφεραν αποτελέσματα για πυρηνικό αλλά όχι μιτοχονδριακό DNA. Η παραγωγή DNA ήταν χαμηλή και αντιφατική, με τα αντίγραφα πολυμεράσης να αποτυγχάνουν να αποφέρουν αναπαραγώγιμα αποτελέσματα. Στο Κουφόβουνο οκτώ από τους είκοσι σκελετούς, που εξετάστηκαν, έδωσαν στοιχεία για μιτοχονδριακό ή/και πυρηνικό DNA, ενώ στον Ταφικό Κύκλο Β των Μυκηνών ενδείξεις για μιτοχονδριακό DNA έδωσαν τέσσερεις από τους είκοσι δύο σκελετούς, που μελετήθηκαν. Σε δύο περιπτώσεις επιβεβαιώθηκε η ένδειξη στενής συγγένειας, κάτι το οποίο είχε ήδη προταθεί με την αποκατάσταση των προσώπων: το γεγονός αυτό εγείρει ενδιαφέροντα ερωτήματα σχετικά με τις κοινωνικές σχέσεις και το ρόλο γυναικών υψηλής κοινωνικής στάθμης στην κοινωνία της Μέσης και της Ύστερης Εποχής του Χαλκού. Συμπεραίνουμε ότι, αν και μπορεί να αναγνωριστεί DNA σε ορισμένους σκελετούς της Ανατολικής Μεσογείου των τελευταίων αιώνων της Εποχής του Χαλκού, δεν εντοπίζεται συχνά σε υλικό αυτής της εποχής και ενδεχομένως απουσιάζει από παλαιότερο υλικό.

Brodie, Neil, A Reassessment of Mackenzie's Second and Third Cities at Phylakopi

Duncan Mackenzie's interpretation of the Phylakopi stratigraphy, which he presented in 1904 as the final chapter of the excavation report, continues to structure discussion of the site's history. Mackenzie proposed a sequence of three 'Cities', which are seen to correspond to EC III, MC, and LC periods of occupation respectively. This paper examines Mackenzie's interpretation in light of his own notes taken during excavation, and the results of subsequent excavations undertaken by Dawkins and Droop in 1911 and Renfrew from 1974 to 1977. It concludes that while the urban sequence at Phylakopi is probably more complex than Mackenzie appreciated, his suggestion of a three City succession is broadly correct, but that the Second City should be redated to MC–LC II, and the Third City to LC III.

Επαναξιολόγηση της Δεύτερης και Τρίτης Πόλης του Mackenzie στη Φυλακωπή

Η ερμηνεία του Duncan Mackenzie για την στρωματογραφία της Φυλακωπής, που παρουσίασε το 1904 στο τελευταίο κεφάλαιο της σχετικής ανασκαφικής έκθεσης, εξακολουθεί να προκαλεί συζήτηση για την ιστορία της θέσης. Ο Mackenzie πρότεινε τη διαδοχή τριών 'Πόλεων', οι οποίες φαίνεται ότι αντιστοιχούν στις ΠΚ III, ΜΚ και ΥΚ περιόδους κατοίκησης. Το εν λόγω άρθρο εξετάζει την ερμηνεία του Mackenzie σύμφωνα με τις προσωπικές του σημειώσεις κατά την ανασκαφή και τα αποτελέσματα μεταγενέστερων ανασκαφικών ερευνών, που διεξήχθησαν το 1911 από τους Dawkins και Droop και την περίοδο 1974–1977 από τον Renfrew. Συμπεραίνεται ότι ενώ η διαδοχή των οικιστικών φάσεων στη Φυλακωπή είναι πιθανώς περισσότερο περίπλοκη από την αρχική εκτίμηση του Mackenzie, η πρότασή του για την ύπαρξη τριών διαδοχικών Πόλεων είναι γενικά σωστή. Ωστόσο, η Δεύτερη Πόλη θα πρέπει να επαναχρονολογηθεί στη ΜΚ-ΥΚ II και η Τρίτη στην ΥΚ III.

Cadogan, Gerald, Nicolas Coldstream (1927–2008)

Nicolas Coldstream, archaeologist of Greece and the Mediterranean in the 9th and 8th centuries BC, was born in India, educated in England, and carried out the research for his first masterpiece *Greek Geometric Pottery* (1968) while Macmillan Student at the British School at Athens (1957–60). In 1960 he began a long career at the University of London, culminating with the Yates Chair of Classical Archaeology at University College. Renowned as a teacher, he drew many graduate students, especially from Greece and Cyprus. As a prolific scholar, he also wrote *Geometric Greece* (1977), many articles, several reports on excavations including *The Sanctuary of Demeter* at Knossos (1973), the *Knossos North Cemetery* (1996) with Hector Catling, and *Kythera* (1972) with George Huxley, as well as the revised editions of his two fundamental monographs.

Nicolas Coldstream (1927–2008)

O Nicolas Coldstream, αρχαιολόγος της Ελλάδας και της Μεσογείου του 9ου και 8ου αιώνα π.Χ., γεννήθηκε στην Ινδία, σπούδασε στην Αγγλία και πραγματοποίησε έρευνα για την πρώτη του εξαιρετική μονογραφία Greek Geometric Pottery (1968) ως Macmillan Student της Βρετανικής Σχολής Αθηνών (1957–1960). Το

1960 ξεκίνησε την πολύχρονη σταδιοδρομία του στο Πανεπιστήμιο του Λονδίνου, αποκορύφωμα της οποίας υπήρξε η εκλογή του στην έδρα Yates της Κλασικής Αρχαιολογίας στο University College. Διάσημος πανεπιστημιακός δάσκαλος, προσέλκυσε πολλούς μεταπτυχιακούς φοιτητές, ιδιαίτερα από την Ελλάδα και την Κύπρο. Επιστήμονας με μεγάλο ερευνητικό και συγγραφικό έργο, δημοσίευσε επίσης τη μονογραφία Geometric Greece (1977), πλήθος άρθρων και αρκετές ανασκαφικές εκθέσεις μεταξύ των οποίων The Sanctuary of Demeter στην Κνωσό (1973), Knossos North Cemetery (1996) με τον Hector Catling, Kythera (1972) με τον George Huxley, καθώς επίσης και τις αναθεωρημένες εκδόσεις των δύο βασικών μονογραφιών του.

Francis, K.D., Bescoby, D.J. and Gjipali, I., A Preliminary Investigation of Two Prehistoric Cave Sites in Southern Albania

In this article we describe the evaluation of two prehistoric sites situated within the coastal zone of south-western Albania, originally investigated by the Italian prehistorian Luigi Cardini in 1939. The first is a cave site in the town of Himara; the second a rock-shelter at Kanalit in the Acroceraunian Mountains to the north. Investigations at both locations revealed stratified evidence of prehistoric activity dating from the mid-Holocene. At Kanalit, an extensive lithic assemblage provided evidence for the exploitation of the adjoining coastal lowlands during the Mesolithic, while at Himara, a largely unbroken sequence of deposits records often intensive human activity at the cave from the Early Bronze Age. Radiocarbon dates have provided a significant independent chronological marker for Early/Middle Bronze Age horizons. The ceramic evidence indicates a predominance of local influences, the site not becoming part of wider trading networks until the late Iron Age, *c.* seventh to sixth centuries BC.

Προκαταρκτική έρευνα δύο προϊστορικών θέσεων σε σπήλαια της νοτίου Αλβανίας

Σε αυτό το άρθρο πραγματευόμαστε τη σημασία δύο προϊστορικών θέσεων, οι οποίες βρίσκονται στην παράκτια ζώνη της ΝΔ Αλβανίας. Οι θέσεις αυτές είχαν αρχικά ερευνηθεί από τον Ιταλό προϊστορικό αρχαιολόγο Luigi Cardini το 1939. Η πρώτη θέση αφορά ένα σπήλαιο στην πόλη της Χειμάρρας και η δεύτερη μία βραχοσκεπή, στη θέση Kanalit, στα Ακροκεραύνια όρη προς βορρά. Έρευνες στις δύο θέσεις αποκάλυψαν στρωματογραφημένες ενδείξεις προϊστορικής δραστηριότητας, που χρονολογούνται από το μέσο Ολόκαινο. Στη θέση Kanalit ένα ευρύ σύνολο λίθινων αντικειμένων παρέχει στοιχεία για την εκμετάλλευση των γειτονικών παράκτιων πεδινών περιοχών κατά τη Μεσολιθική περίοδο. Στο σπήλαιο της Χειμάρρας μία σειρά από αδιάσπαστες, στο μεγαλύτερο μέρος τους, αποθέσεις μαρτυρεί συχνά έντονη ανθρώπινη δραστηριότητα από την Πρώιμη Εποχή του Χαλκού. Οι ραδιοχρονολογήσεις παρέχουν ένα σημαντικό ανεξάρτητο χρονολογικό δείκτη για τους ορίζοντες της Πρώιμης/Μέσης Εποχής του Χαλκού. Η κεραμική φανερώνει την επικράτηση τοπικών επιρροών, με τη θέση αυτή να μην λαμβάνει μέρος στα ευρύτερα εμπορικά δίκτυα πριν από την όψιμη Εποχή του Σιδήρου, περίπου τον 7ο – 6ο αιώνα π.Χ.

French, E.B., Stockhammer, Ph. and Damm-Meinhardt, U., Mycenae and Tiryns: the Pottery of the Second Half of the Thirteenth Century BC – Contexts and Definitions

Since 1950 widespread and important excavation has taken place in the Argolid. For Mycenae and Tiryns much of the post-excavation study has now been completed but has not yet reached final publication. The use of material from the preliminary reports has, however, led to conclusions which are not justified. The study teams at both sites, working in close collaboration, present here the detailed stratigraphic background to their work and the definitive assignments produced. The diagnostic pottery for the second half of the thirteenth century BC (LH III B2 Early and Late), which culminated in a major destruction at each site, is illustrated with its contextual background. The relationship between the two sites can thus be accurately assessed and the evidence will enable well-founded historical hypotheses.

Συσχετίζοντας την πρόσφατη έρευνα: η κεραμική από τις Μυκήνες και την Τίρυνθα κατά το δεύτερο ήμισυ του δέκατου τρίτου αιώνα π.Χ.

Από το 1950 εκτεταμένες και σημαντικές ανασκαφικές έρευνες έχουν λάβει χώρα στην Αργολίδα. Για τις Μυκήνες και την Τίρυνθα ένα μεγάλο μέρος της μετα-ανασκαφικής μελέτης έχει πλέον ολοκληρωθεί δίχως ωστόσο να έχει φτάσει στο τελικό στάδιο της δημοσίευσης. Η χρήση υλικού από τις προκαταρκτικές εκθέσεις έχει ωστόσο οδηγήσει σε συμπεράσματα, τα οποία δεν μπορούν να τεκμηριωθούν. Οι ερευνητικές ομάδες των δύο θέσεων, στενά συνεργαζόμενες, παρουσιάζουν στο άρθρο αυτό το λεπτομερές στρωματογραφικό πλαίσιο της εργασίας τους και τις τελικές εκθέσεις. Η διαγνωστική κεραμική για το δεύτερο ήμισυ του δέκατου τρίτου αιώνα π.Χ. (ΥΕ ΙΙΙ Β2 Πρώιμη και Ύστερη), περίοδος που σημαδεύτηκε από μία μεγάλη καταστροφή και στις δύο θέσεις, επεξηγείται στο πλαίσιο των συνευρημάτων της. Η σχέση των δύο θέσεων μπορεί με αυτόν τον τρόπο να αξιολογηθεί με μεγαλύτερη ακρίβεια. Τα στοιχεία αυτά θα επιτρέψουν τη διατύπωση καλά θεμελιωμένων ιστορικών υποθέσεων.

HOPE SIMPSON, R., Prehistoric Laconia: A Note on the Location of the Site of Souroukla

In 1921, Carl Blegen found Mycenaean and other ancient sherds at a site then named Souroukla, near Skala in Laconia. William Coulson and others have mistakenly assumed that Souroukla is to be identified as Ayios Stephanos, the important site surveyed by the author in 1956 and later excavated by the British School under Lord William Taylour. The author here reveals that the true identity of Souroukla is the site of Skala: Ayios Nikolaos.

Προϊστορική Λακωνία: Μία σημείωση αναφορικά με την τοποθεσία της θέσης Σουρούκλα

Το 1921 ο Carl Blegen εντόπισε μυκηναϊκά και άλλα αρχαία όστρακα στην τότε ονομαζόμενη θέση Σουρούκλα, κοντά στη Σκάλα Λακωνίας. Ο William Coulson και άλλοι μελετητές λανθασμένα υπέθεσαν ότι η θέση Σουρούκλα πρέπει να ταυτιστεί με τον Άγιο Στέφανο, μία σημαντική θέση, την οποία ερεύνησε επιφανειακά ο γράφων το 1955 και αργότερα ανεσκάφη από την Βρετανική Σχολή υπό τη διεύθυνση του Λόρδου William Taylour. Ο γράφων δείκνει στο παρόν άρθρο την ταύτιση της Σουρούκλας με τη θέση Σκάλα: Άγιος Νικόλαος.

KONSTANTINIDI-SYVRIDI, ELENA AND KONTAKI, MARIA, Casting Finger Rings in Mycenaean Times: Two Unpublished Moulds at the National Archaeological Museum, Athens

The recording of two unpublished moulds in the storeroom of the Prehistoric Collections of the National Archaeological Museum, Athens, presented here, provide the stimulus for a re-examination of the construction method of the bezeled/signet rings of Mycenaean times. The moulds, one of semi-cylindrical shape and the other rectangular, belong to a limited class of items from Crete, Mainland Greece, and Enkomi, Cyprus.

It is possible that such moulds have served for the construction of the wax model of the artefacts, in the lost wax technique and not directly for the cast of gold, since the very construction of them, which is time-consuming and necessitates the skills of specialized craftsmen, indicates that they did not serve for a single use but rather for several uses. On the other hand, even steatite, the stone mostly used for such moulds, cannot adhere to continuous pressure to high temperatures, necessary for casting gold.

Χυτεύοντας δακτυλίδια με σφενδόνη στη Μυκηναϊκή εποχή: Δύο αδημοσίευτες μήτρες στο Εθνικό Αρχαιολογικό Μουσείο, Αθήνα

Στην παρούσα μελέτη καταγράφονται δύο αδημοσίευτες μήτρες από την αποθήκη της Προϊστορικής Συλλογής του Εθνικού Αρχαιολογικού Μουσείου στην Αθήνα, προσφέροντας το ερέθισμα για μία επανεξέταση της τεχνικής κατασκευής των δακτυλιδιών με σφενδόνη της Μυκηναϊκής εποχής. Οι μήτρες, από τις οποίες η μία είναι ημικυλινδρική και η άλλη ορθογώνια, ανήκουν σε μία περιορισμένη τάξη ευρημάτων, που προέρχονται από την Κρήτη, την Ηπειρωτική Ελλάδα και την Έγκωμη της Κύπρου.

Είναι πιθανό ότι αυτές οι μήτρες να χρησιμοποιήθηκαν για την κατασκευή των κέρινων εκμαγείων των δακτυλιδιών κατά την τεχνική του «χαμένου κεριού» και όχι για την απευθείας χύτευση χρυσού. Η ίδια η κατασκευή τους, που προϋποθέτει πολύ χρόνο και ειδικευμένους τεχνίτες, υποδεικνύει ότι δεν χρησιμοποιήθηκαν μόνο για μία φορά. Από την άλλη πλευρά, ακόμη και ο στεατίτης, ο λίθος που κατεξοχήν χρησιμοποιήθηκε για την κατασκευή αυτών των αντικειμένων, δεν θα μπορούσε να αντέξει τις υψηλές θερμοκρασίες, που απαιτούνται για την χύτευση του χρυσού σε διαδοχικές χρήσεις.

Mountjoy, P.A., The Late Minoan II-III and Mycenaean Pottery from the 1911 Excavations at Phylakopi on Melos

This article presents the Late Minoan II–III B and the Late Helladic I–III C pottery from the 1911 excavations of J. Dawkins and J. Droop at Phylakopi on Melos.

The material from the 1911 excavations fills gaps in the corpus of pottery provided by the 1896–9 excavations and the 1974–7 excavations. It fills out our knowledge of the LH III A2 pottery and adds a considerable amount of LH III A1 and LH III C material. A small group of vessels caught in a LM I B/LH II A destruction confirms the supposition that full Marine Style was circulating together with open ground Marine Style and Alternating Style vases. The LH III C pottery adds some more parallels to the pottery from Koukounaries on Paros and also has one or two parallels to pottery from the east Aegean and pottery exported from there to the Levant.

Η Υστερομινωική II-III και η Μυκηναϊκή κεραμική από τις ανασκαφές του 1911 στη Φυλακωπή της Μήλου

Σε αυτό το άρθρο παρουσιάζεται η Υστερομινωική II-III Β και η Υστεροελλαδική I-III Γ κεραμική από τις ανασκαφές των J. Dawkins και J. Droop το 1911 στη Φυλακωπή της Μήλου.
Το υλικό από τις ανασκαφές του 1911 συμπληρώνει τα κενά των δημοσιεύσεων της κεραμικής από τις ανασκαφικές περιόδους 1896-99 και 1974-77. Συμπληρώνει τη γνώση μας για την ΥΕ III Α2 κεραμική και προσθέτει μία σημαντική ποσότητα υλικού της ΥΕ III Α1 και ΥΕ III Γ. Ένας μικρός αριθμός αγγείων, που εντοπίστηκε στην ΥΜ I Β / ΥΕ II Α καταστροφή, επιβεβαιώνει την υπόθεση ότι ο πλήρης θαλάσσιος ρυθμός ήταν διαδεδομένος συγχρόνως με το θαλάσσιο ρυθμό επί ανοικτού βάθους και με τα αγγεία του εναλλασόμενου στυλ. Η ΥΕ III Γ κεραμική προσθέτει ορισμένα ακόμη παράλληλα στην κεραμική από τις Κουκουναριές της Πάρου. Επιπλέον παρουσιάζει ένα ή δύο παράλληλα με την κεραμική του ανατολικού Αιγαίου, όπως και με την εξαγόμενη από εκεί κεραμική προς τη Συροπαλαιστίνη.

Nafplioti, Argyro, Mycenae Revisited Part 2. Exploring the Local versus Non-local Geographical Origin of the Individuals from Grave Circle A: Evidence from Strontium Isotope Ratio ($^{87}Sr/^{86}Sr$) Analysis

Strontium isotope ratio ($^{87}Sr/^{86}Sr$) analysis was applied to dental enamel samples from eleven adults from Grave Circle A at Mycenae in order to investigate their local versus non-local geographical origin. The results of this analysis suggest a relatively high intra-sample variation in $^{87}Sr/^{86}Sr$ values for the Grave Circle A Mycenaeans. Based on these results, only two individuals may be identified as locals at Mycenae. Of the other nine individuals, three may be identified as non-locals at this site. Because two of these are the only females from Grave Circle A tested for $^{87}Sr/^{86}Sr$ it is tentatively suggested that this finding may reflect marital patterns and the non-local origin of the females associated with high social ranking at Mycenae. However, owing to the paucity of data on the biologically available strontium at sites in the Aegean, it cannot be established with certainty whether the individuals identified as non-locals originated a few dozen or hundreds of kilometres away from Mycenae. Finally, conclusions on the local versus non-local origin of the remaining six individuals are tentative. Their ratios may equally to a non-local origin reflect a variegated diet that comprised 'non-local' amongst 'local' foodstuffs, which would not be unexpected for a Mycenaean palace economy of the 'redistributive' type.

Μυκηνών επανεξέταση Μέρος 2. Εξερευνώντας την τοπική ή μη τοπική γεωγραφική προέλευση ατόμων από τον Ταφικό Κύκλο Α: Ενδείξεις από την ανάλυση της ισοτοπικής αναλογίας του στροντίου ($^{87}Sr/^{86}Sr$)

Η ανάλυση της ισοτοπικής αναλογίας του στροντίου ($^{87}Sr/^{86}Sr$) εφαρμόστηκε σε δείγματα οδοντικού σμάλτου από έντεκα ενήλικες από τον Ταφικό Κύκλο Α στις Μυκήνες προκειμένου να διερευνηθεί η τοπική ή μη-τοπική γεωγραφική τους προέλευση. Σύμφωνα με τα αποτελέσματα των αναλύσεων παρατηρείται υψηλή ενδο-πληθυσμιακή ποικιλότητα σε $^{87}Sr/^{86}Sr$ τιμές για τους Μυκηναίους από τον Ταφικό Κύκλο Α. Μόνο δύο από τα εξετασθέντα άτομα ταυτοποιήθηκαν ως αυτόχθονες στις Μυκήνες. Από τα υπόλοιπα εννέα, τρία άτομα χαρακτηρίστηκαν επήλυδες. Επειδή τα δύο από τα τρία αυτά άτομα είναι οι μόνες γυναίκες από τον Ταφικό Κύκλο Α, στις οποίες έγινε δειγματοληψία για την ανάλυση της ισοτοπικής αναλογίας του στροντίου, με επιφύλαξη προτείνεται ότι τα αποτελέσματα που παρουσιάζονται εδώ είναι πιθανό να αντικατοπτρίζουν γαμήλιες πρακτικές και τη μη-τοπική προέλευση των γυναικών από τα ανώτερα κοινωνικά στρώματα στις Μυκήνες. Ωστόσο, λόγω του εξαιρετικά μικρού αριθμού δεδομένων για το βιολογικά διαθέσιμο στρόντιο σε θέσεις του Αιγαιακού χώρου, δεν είναι δυνατό να καθοριστεί με βεβαιότητα ο τόπος προέλευσής τους, ο οποίος μπορεί να απέχει μερικές δεκάδες ή εκατοντάδες χιλιόμετρα από τις Μυκήνες. Τέλος, λιγότερο σαφή είναι τα συμπεράσματα για την προέλευση των υπόλοιπων έξι εξετασθέντων ατόμων. Οι τιμές $^{87}Sr/^{86}Sr$ είναι δυνατόν σε συνδυασμό με μια μη-τοπική καταγωγή των εν λόγω ατόμων να αντικατοπτρίζουν ποικιλία ‘τοπικών’ και ‘μη-τοπικών’ τροφών στη δίαιτά τους. Το συμπέρασμα αυτό δε μας ξαφνιάζει σε μια οικονομία του ‘αναδιανεμητικού’ τύπου, στον οποίο υποστηρίζεται πως ανήκει η Μυκηναϊκή οικονομία της ανακτορικής εποχής.

Papazoglou-Manioudaki, L., Nafplioti, A., Musgrave, J.H., Neave, R.A.H., Smith, D. and Prag, A.J.N.W., Mycenae Revisited Part 1. The Human Remains from Grave Circle A: Stamatakis, Schliemann and Two New Faces from Shaft Grave VI

Building work at the National Archaeological Museum in Athens in 2003 led to the rediscovery of the two male skeletons from Shaft Grave VI at Mycenae, found by Panayiotis Stamatakis in 1877 as he completed the excavation of Grave Circle A begun by Schliemann. The find provided a triple opportunity. First came a re-assessment of Stamatakis's important and often pioneering role both at Mycenae and in the archaeology of the later Bronze Age, which has generally been overlooked both because of Schliemann's very vocal antagonism and because of his own overwork and early death. Second, a detailed study of the skulls along with the post-cranial bones allowed a reconstruction of the faces of the two men to set beside the earlier reconstructions of the faces of seven individuals from Grave Circle B. This showed that although the two men were very likely related to each other, one could not demonstrate kinship with any of the seven faces from Circle B on the basis of their facial appearance alone. Finally – to be described in subsequent articles – it opened the way for the first modern morphological and chemical analysis (using strontium isotope ratios) of the entire collection of surviving human skeletal material from Grave Circle A to determine the number of individuals represented, their biological sex and their age at death. By assessing the quality of their living conditions as reflected in their skeletal and dental health, and by exploring skeletal evidence of engagement in physical activities through activity-related modifications there was the opportunity to reconstruct the lifestyle of the men and women buried in the grave circle.

Μυκηνών επανεξέταση Μέρος 1. Τα ανθρώπινα υπολείμματα από τον Ταφικό Κύκλο Α: Σταματάκης, Schliemann και δύο νέα πρόσωπα από το Λακκοειδή τάφο VI

Οικοδομικές δραστηριότητες στο Εθνικό Αρχαιολογικό Μουσείο στην Αθήνα το 2003 οδήγησαν στην ανακάλυψη εκ νέου των δύο ανδρικών σκελετών από το Λακκοειδή Τάφο VI, που αποκάλυψε ο Παναγιώτης Σταματάκης το 1877 με την ολοκλήρωση της ανασκαφής του Ταφικού Κύκλου Α, η οποία ξεκίνησε από τον Heinrich Schliemann. Αυτό το εύρημα μας έδωσε μία τριπλή ευκαιρία. Πρώτον, επαναξιολογήθηκε ο

σημαντικός και συχνά πρωτοποριακός ρόλος, που διαδραμάτισε ο Σταματάκης στις Μυκήνες και την αρχαιολογία της ύστερης Εποχής του Χαλκού. Ο ρόλος του αυτός γενικά παραβλέφθηκε εξαιτίας τόσο του έντονου ανταγωνισμού εκ μέρους του Schliemann όσο και του υπερβολικού φόρτου εργασίας αλλά και του πρώιμου θανάτου του Σταματάκη. Δεύτερον, η λεπτομερής μελέτη των κρανίων και μετα-κρανιακών οστών επέτρεψε την αποκατάσταση των προσώπων των δύο ανδρών και τη σύγκρισή τους με τα πρόσωπα επτά ατόμων από τον Ταφικό Κύκλο Β, τα οποία είχαν νωρίτερα αποκατασταθεί. Αυτή η σύγκριση έδειξε ότι παρά την πιθανή συγγένεια των δύο ανδρών του τάφου VI, δεν μπορεί να υποστηριχθεί ανάλογη σχέση μεταξύ αυτών και των επτά προσώπων από τον Ταφικό Κύκλο Β με μόνο κριτήριο τα φυσιογνωμικά τους χαρακτηριστικά. Τέλος, όπως θα παρουσιαστεί σε επόμενα άρθρα, η μελέτη αυτή άνοιξε το δρόμο για την πρώτη σύγχρονη μορφολογική και χημική ανάλυση (της ισοτοπικής αναλογίας του στροντίου) ολόκληρης της συλλογής ανθρωπίνων σκελετικών υπολειμμάτων από τον Ταφικό Κύκλο Α, με στόχο τον προσδιορισμό του αριθμού των αντιπροσωπευομένων ατόμων και τον καθορισμό του βιολογικού φύλου και της ηλικίας θανάτου αυτών. Αξιολογώντας την ποιότητα των συνθηκών διαβίωσης των ατόμων αυτών, όπως αυτή αντικατροπτίζεται στη σκελετική και οδοντική τους υγεία, και εξετάζοντας σκελετικές μαρτυρίες για την ενασχόλησή τους με φυσικές δραστηριότητες κατέστη δυνατό να ανασυνθέσουμε τον τρόπο ζωής των ανδρών και γυναικών που είχαν ταφεί στον Ταφικό Κύκλο Α.

Renfrew, C., Philaniotou, O., Brodie, N. and Gavalas, G., The Early Cycladic Settlement at Dhaskalio, Keros: Preliminary Report of the 2008 Excavation Season

The 2008 excavations on the small island of Dhaskalio opposite Dhaskalio Kavos on the Cycladic island of Keros are reviewed. An account is given of the survey, recording many walls of the early Bronze Age, and of the excavations, continued from the 2007 season. Excavations at the summit of Dhaskalio revealed a substantial building 16 m long and 4 m wide, within which was discovered the 'Dhaskalio hoard' comprising a chisel, an axe-adze, and a shaft-hole axe of copper or bronze. Study of the pottery reveals continuity, within which a sequence of three phases within the Early Cycladic II and III periods can be established.

Excavations were continued and concluded within the Special Deposit at Kavos South with the recovery of many more special but fragmentary materials including marble vessels and figurines. Specialist studies for the geomorphology, geology, petrology, ceramic petrology, metallurgy and environmental aspects (botanical and faunal remains, phytoliths) are in progress. No more fieldwork is planned prior to final publication of the 2006 to 2008 seasons.

Ο Πρωτοκυκλαδικός οικισμός στον Κάβο Δασκαλιού: Προκαταρκτική έκθεση της ανασκαφικής περιόδου του έτους 2008

Στο άρθρο επιχειρείται ένας συνοπτικός απολογισμός των ανασκαφών της περιόδου του 2008 στην νησίδα Δασκαλιό, απέναντι από τον Κάβο Δασκαλιού, στο ΝΔ άκρο της νήσου Κέρου, των Κυκλάδων. Περιληπτικά αναφέρονται τα αποτελέσματα της τοπογράφησης με τον εντοπισμό πολλών τοίχων της Πρώιμης Εποχής του Χαλκού, αλλά και αυτά της ανασκαφής, η οποία αποτελεί την συνέχεια των ανασκαφών του 2007. Κατά τις ανασκαφές στην κορυφή του Δασκαλιού αποκαλύφθηκε ένα ευμέγεθες κτήριο μήκους 16 μέτρων και πλάτους 4 μέτρων, εντός του οποίου βρέθηκε ο «Θησαυρός του Δασκαλιού», ο οποίος αποτελείται από μία σμίλη, μία αξίνα-πέλεκυ, και έναν πέλεκυ με συμφυή οπή για την τοποθέτηση του στειλεού, όλα χάλκινα ή μπρούτζινα. Η μελέτη της κεραμικής απέφερε σημαντικά αποτελέσματα και απέδειξε ότι υπάρχει συνέχεια. Η αυτή ίδια μελέτη κατέδειξε μία ακολουθία τριών φάσεων, οι οποίες χρονολογήθηκαν από την Πρωτοκυκλαδική II έως και την Πρωτοκυκλαδική III περίοδο.

Οι ανασκαφές στον Κάβο Δασκαλιού συνεχίστηκαν και ολοκληρώθηκαν στην περιοχή της Νότιας Ειδικής Απόθεσης με την αποκάλυψη πλήθους ιδιαίτερων, αλλά αποσπασματικά σωζόμενων, ευρημάτων, μεταξύ των οποίων, πολλών μαρμάρινων αγγείων και ειδωλίων.

Οι εξειδικευμένες μικρομορφολογικές-γεωαρχαιολογικές, γεωλογικές και πετρογραφικές μελέτες, αλλά και οι αναλύσεις πηλού και οι μελέτες, που αφορούν στην αρχαιομεταλλουργία και στο παλαιοπεριβάλλον

(αναλύσεις των καταλοίπων της χλωρίδας και της πανίδας αλλά και των φυτολίθων), βρίσκονται σε εξέλιξη. Άλλες έρευνες επί του εδάφους προς το παρόν δεν προγραμματίζονται, πριν από την ολοκλήρωση της τελικής δημοσίευσης των αποτελεσμάτων των ερευνών των περιόδων 2006 έως και 2008.

Salapata, Gina, Female Triads on Laconian Terracotta Plaques

Archaic and Classical terracotta relief plaques discovered in votive deposits in Lakonia and representing three standing females raise two questions: firstly, whether their appearance in groups of three means that they are a defined triad or is just an indication of unlimited plurality; and secondly, whether they are divine or mortal.

It is concluded that no single interpretation can be ascribed to all cases. Most triads seem to represent mortal worshippers rather than a specific divine or semi-divine triad. However, an exceptional triad flanked by snakes may represent the Erinyes. Such an interpretation would harmonize with the nature of the cult at the sanctuary in which they were dedicated—that of Alexandra (Kassandra) and Agamemnon, both murdered in Lakonia, according to a local tradition. An offering with the representation of the avenging spirits would have been very appropriate for Agamemnon and especially Kassandra, who suffered a wrongful death that was never properly avenged.

Θηλυκές τριάδες σε πήλινα Λακωνικά πλακίδια

Πήλινα ανάγλυφα πλακίδια των κλασικών και αρχαϊκών χρόνων, που βρέθηκαν σε αναθηματικούς αποθέτες στη Λακωνία και απεικονίζουν τρεις ιστάμενες θηλυκές μορφές, εγείρουν δύο ερωτήματα: πρώτον, εάν η εμφάνισή τους σε ομάδες των τριών υποδηλώνει μία καθορισμένη τριάδα ή είναι απλώς μία ένδειξη απεριόριστης πληθωρικότητας· και δεύτερον, εάν αναπαριστούν θεϊκές ή θνητές μορφές.

Συμπεραίνεται ότι δεν υπάρχει μία ερμηνεία για όλες τις περιπτώσεις. Οι περισσότερες τριάδες φαίνεται πως αναπαριστούν θνητούς λάτρεις, παρά ένα συγκεκριμένο σύνολο θεϊκών μορφών ή ημίθεων. Ωστόσο μία εξαιρετική τριάδα περιστοιχιζόμενη από φίδια ίσως απεικονίζει τις Ερινύες. Αυτή η ερμηνεία θα μπορούσε να εναρμονιστεί με τη φύση της λατρείας του ιερού, όπου ήταν αφιερωμένα τα πλακίδια, δηλαδή με το ιερό της Αλεξάνδρας (Κασσάνδρας) και του Αγαμέμνονα, που σύμφωνα με την τοπική παράδοση είχαν και οι δύο δολοφονηθεί στη Λακωνία. Ένα ανάθημα με την αναπαράσταση των εκδικούμενων πνευμάτων θα ήταν πολύ ταιριαστό για τον Αγαμέμνονα και ιδιαίτερα για την Κασσάνδρα, η οποία υπέφερε έναν άδικο θάνατο, εκδίκηση για τον οποίο δεν έλαβε ποτέ.

Smith, Tyler Jo, East Greek Pottery in the Collection of the British School at Athens

Among the antiquities in the collection of the British School, there are a few examples of East Greek pottery, including Wild Goat Style, Chian, Fikellura, and Clazomenian as well as a Rosette Bowl and a Bird Bowl. Following a summary of the British School's excavations and role at Naukratis, the site where much of this East Greek pottery was discovered, the objects from the collection are presented in both summary and catalogue form. An appendix is dedicated to an Attic polychrome phiale mesomphalos, which, although not East Greek, shares many technical and stylistic features with some East Greek wares, and was originally identified as Vroulian. It is briefly considered in relation to East Greek and Archaic pottery.

Ανατολίζουσα ελληνική κεραμική στη συλλογή της Βρετανικής Σχολής των Αθηνών

Μεταξύ των αρχαιοτήτων της συλλογής της Βρετανικής Σχολής, υπάρχουν ορισμένα παραδείγματα ανατολίζουσας ελληνικής κεραμικής, στα οποία περιλαμβάνονται δείγματα του ρυθμού των Αιγάγρων, της Χίου, των Φικελλούρων, των Κλαζομενών, καθώς επίσης και δύο ανοικτά αγγεία με διακόσμηση ρόδακα και πτηνών αντίστοιχα. Μετά από μία σύνοψη των ανασκαφών και του ρόλου της Βρετανικής Σχολής στη Ναύκρατι, τη θέση όπου ανακαλύφθηκε μεγάλο μέρος αυτής της ανατολίζουσας ελληνικής κεραμικής, τα

ευρήματα της συλλογής παρουσιάζονται σε σύνοψη και σε κατάλογο. Ένα παράρτημα είναι αφιερωμένο σε μία αττική πολύχρωμη μεσόμφαλη φιάλη, η οποία αν και δεν ανήκει στον ανατολίζοντα ρυθμό, μοιράζεται αρκετά τεχνικά και στυλιστικά χαρακτηριστικά με ορισμένα ανατολίζοντα ελληνικά αγγεία. Η φιάλη αυτή είχε αρχικά ταυτιστεί ως αγγείο τύπου Βρουλιάς. Εν συντομία θεωρείται ότι έλκει στοιχεία από την ανατολίζουσα ελληνική και αρχαϊκή κεραμική.

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NICOLAS COLDSTREAM (1927–2008)[1]

NICOLAS Coldstream was one of that small and distinguished group of archaeologists whose years as students at the British School at Athens led to their writing masterpieces that were immediately acclaimed as standard works. Nicolas's first masterpiece was *Greek Geometric Pottery* (or *GGP* as he, and many others, called it), which came out in 1968, eight years after he had finished a three sessions' stint (1957–60) as Macmillan Student. Others in this select group would include Humfry Payne, the first person to have a Macmillan award (1929) for *Necrocorinthia* (1931), and Vincent Desborough (Macmillan Student 1937–9) for *Protogeometric Pottery* (1952).

Nicolas had a circuitous path to archaeology. Throughout his life he had a deep love for, and knowledge of, classical music, and he was an excellent pianist—indeed, so determined to improve his playing that at the age of 57 he started lessons again, with Ruth Nye of the Yehudi Menuhin School and the Royal College of Music, and for over twenty years had a lesson with her every six to eight weeks. It is hard to say whether he could have been a professional musician rather than a top-notch amateur, both sensitive and precise; but he certainly could have been a brilliant mathematician, doubtless as a professor: many mathematicians, of course, and scientists have also been excellent musicians. In Nicolas's case, the congruence of the inherent formality of music, mathematics, and the Geometric style of table and funerary wares, makes satisfying and comprehensive intellectual and artistic sense of his approaches to life, art, and scholarship and his achievements. How then did Nicolas come to attack the problems, discern the harmonies, explicate the syllogisms, and resolve the discords of Geometric pottery and history in the ninth and eighth centuries BC, that exciting period of Homer, the arrival of a new way of writing an old language, and wide horizons throughout the Mediterranean—especially if you were a Greek, and from Euboea—that all helped to shape what we call classical Greece? For the four decades since *GGP* came out, Nicolas was the doyen of research into those dynamic early times.

John Nicolas Coldstream was born on 30 March 1927 in Lahore, then part of (British) India and now in Pakistan, where his father John Coldstream was a High Court judge. Knighted on retirement in 1938, he then spent a year as Chief Minister to the Maharajah of Kapurthala, a Sikh state near Amritsar. Nicolas's mother, Phyllis Hambly, had worked when young in a fashion house in London: the family's oral tradition has it that John Coldstream spotted her in Piccadilly in 1916, when home on leave from France, followed her, and asked her out; marriage ensued.

After, doubtless, the care of a nanny (and whether she was an ayah, or English or Scottish, is unknown), Nicolas was sent off in 1934 on the long voyage 'home' to England to start his formal education at a preparatory school in Eastbourne. The regime of being sent back to

[1] I am very grateful to Leo Cadogan, Lucy Cadogan, Helen Fields, Lesley Fitton, George Huxley, Alan Johnston, Eri Lemos, Nicoletta Momigliano, Cathy Morgan, Hugh Sackett, Elizabeth and Peter Warren, Dyfri Williams and, above all, Nicky Coldstream for advice, help, and memories. Nicoletta Momigliano also asked me to write this piece.

Obituaries of Nicolas Coldstream appeared in the London press as follows: *Daily Telegraph*, 4 April 2008 (anon.); *The Guardian*, 4 July 2008 (A. W. Johnston); *The Independent*, 15 April 2008 (G. Cadogan); *The Times*, 9 April 2008 (P. M. Warren).

FIG. 1 *a)* Nicolas Coldstream lecturing at University College London; *b)* with his wife, Nicky, in the Eretria apotheke; *c)* working in the Stratigraphical Museum, Knossos; *d)* with Hugh Sackett at a party at the Taverna, Knossos.

England, without usually the convenience of aeroplanes, was totally familiar at the time (and indeed continued into the 1950s, if not later). But it was not quite so bleak for him as for some sons of the Empire, since his mother returned every year for summer holidays with him and his two sisters, Anne and Cynthia. At Christmas and Easter, however, they went to cousins and family friends. It is hard to tell what effect such an upbringing had on Nicolas, beyond its clearly making him hardy and self-reliant, and increasing his deep-seated grit, sense of duty, and willingness to take on chores and responsibilities, notably for the British School at Athens, which was such a feature of his later life.

In 1938 Nicolas had his only trip back to India, being let out of school early for a blessed six months to go to Anne's wedding. He flew unaccompanied with KLM, one of the first Raj children to do so, landing after many stops at Karachi, and then had a 36 hours' train journey to Lahore. The governess who had been hired to keep up his lessons during the long break asked him to write the story of the trip, which the Maharajah of Kapurthala thought was so good that he published it at his own private press. Nicolas's first publication is then *My First Flight* (Jagajit Press, Kapurthala, 1938). Sir John died in 1954, and the following year his mother married an old family friend, Colonel George Osborne: they lived principally at Seend in Wiltshire, where he would produce 72 cases of estimable wine from half an acre of vines on a south-facing slope.

St Cyprian's, Eastbourne was not a happy place for Nicolas or for Eric Blair (George Orwell), although Cyril Connolly quite enjoyed it, as he writes (calling it St Wulfric's) in *Enemies of Promise* (1938). But boys were well drilled there: all three won King's Scholarships to Eton, and so were in College. Among other high-flyers in Nicolas's election (he was seventh in the order), who went up the school with him in an education of the Great and the Good that Plato would have relished, were the future Lords Armstrong of Ilminster (later Secretary to the Cabinet, but alas better known for his, but originally Edmund Burke's, axiom on 'being economical with the truth') and Kingsdown (later Governor of the Bank of England), as well as a 16th baronet, Sir Peter Swinnerton Dyer, the mathematician. For Nicolas, Eton was not an especially happy time either, except that his tutor, Francis Cruso, introduced him into the delights of listening to music on records. He also benefited from being in College, where the dame (matron) was the fearsome Miss Iredale-Smith, who took care that her boys were still fed reasonably well during the war: Nicolas saved the orange peel from school for his mother to make marmalade. At the end he duly won a Scholarship to Eton's sister establishment, King's College, Cambridge.

But first there was National Service, as a subaltern in the Buffs and Highland Light Infantry, which took him to Egypt and Palestine in the last days of the British Mandate, a hairy time, if alleviated by the chance to visit sites and museums and learn the geography at first hand, which would help eventually in understanding Greek interactions in the Iron Age East Mediterranean. He had in fact hoped for Greece—which would have been equally hairy.

About to go up to Cambridge and fearful that he had forgotten his Greek and Latin (by now he had forgone mathematics), he was advised by Patrick Wilkinson at King's to take a vacation term the summer before and read himself back into the subject. Cambridge then went swimmingly. He took a double First, had a part in the triennial Greek play, and made, and heard, plenty of music, singing in choirs and learning the organ (which he later played for services in St Paul's Anglican church in Athens) as well as playing the piano.

From Cambridge Nicolas was recruited to teach classics at Shrewsbury (1952–6), apparently satisfying work with willing and bright boys such as Richard Ingrams and Willie Rushton, two of the founding fathers of *Private Eye*; but it was not totally his *métier*, as became clear when he left for a one-year Temporary Assistant Keepership in the Greek and Roman Department of the British Museum in 1956–7, when Denys Haynes succeeded Bernard Ashmole as Keeper; but his great mentor in the department was Reynold Higgins, who became a close friend. He now encountered Geometric pottery and soon knew that what he wanted to do was to study it and make artistic, cultural, and historical sense of it in its various regional styles and combinations of styles. That the work would entail thorough re-ordering of our understanding of the ninth, eighth, and early seventh centuries BC of Greece was a

development arising from the research on the pottery and not the original main aim. Later, Nicolas put his thoughts together on these issues in another *magnum opus*, *Geometric Greece* (1977), or *GG*. Its second edition (*GG2*), published in 2003, reflects how very much more has been learnt in the quarter-century between, thanks to what he and others had been able to build on the foundations of those twin temples of scholarship, the pioneering *GGP* that set the framework of study of the period and *GG* that put it all in context.

In May 1957 Nicolas arrived at the British School at Athens. He had already been admitted in 1950 and 1954 with Student Privileges, as they were then called; now he spent three years collecting the material for what would become *GGP*. In the late 1950s the School was still a small, collegiate group of usually long-term residents, who included John Graham, Richard Hope Simpson, John Ellis Jones, John Lazenby, and Hugh Sackett; George Huxley, the Assistant Director (until 1958, when Philip Sherrard succeeded him) soon became a close friend; and Jane Rabnett was Secretary. Nicolas travelled widely in Greece collecting material, which was not always easy: he arrived at one museum to be told that the Ephor had left that morning for two years in Germany; and I recall a visit that Richard Barnett, he and I made to Thebes in the mid-1960s. Richard Barnett, then the Western Asiatic Keeper at the British Museum, but also once London Secretary of the School, wanted to look at the Mycenaean ivories from the so-called Kadmeion, but also translated for us the Hebrew epitaphs in the Museum yard; I went for the Mycenaean pottery; and Nicolas wanted the Geometric pottery which, the guards said, was unpublished. We looked hard, and two of us made notes. Then we went out to a *kafeneio*. At once Nicolas said, 'Don't speak', as he wrote out his notes and drew the pots from memory. He also went to Turkey, partly in the Geometric cause, with John Ellis Jones and Hugh Sackett, who recalls how much the Turks liked his old-fashioned good manners; and in 1972 he helped publish pottery from Xanthos in *Fouilles de Xanthos*. Later, he made many Geometric trips to Cyprus and Italy, and especially to Ischia to work with Giorgio Buchner and David and Francesca Ridgway.

The Director of the School during Nicolas's time was Sinclair Hood, who was starting his multi-period programme of stratigraphical excavations at Knossos with the aim of (re-) assessing the validity of Arthur Evans's chronological and ceramic systems. Each year from 1957 to 1961 he took a good number of the students to help, maintaining the tradition of 'School excavations', as had happened at Old Smyrna and in Chios. If the work at Knossos may appear to have concentrated on the Minoan levels beside the Royal Road (although Sinclair Hood was equally diligent in recording what the post-Bronze Age strata could tell about Knossos, much of which Nicolas published in a series of articles in the *Annual*), the project always had a diachronic approach, from Neolithic (where Peter Fraser began the excavation, and John Evans took it over) to post-Bronze Age. The chief later site, midway up Gypsades hill, was known at the time as 'The Terracottas' (hence its Knossos code of TC) or 'Τα αγαλματάκια' (as the foreman Manolis Markoyiannakis would say), where Nicolas directed the excavation for Sinclair Hood, taking over from—yet again—Peter Fraser, who briefly started the work in 1957. In four seasons, Nicolas's assistants included John Hayes and, in 1960, John Ellis Jones and Anthony Snodgrass.

It was a stirring excavation, literally so when the workforce on the other sites (such as Royal Road: North, the Road Trials, and Early Houses) was sent over for a day to help move the dump. From far away you saw swirling clouds of dust. Nicolas's publication of *The Sanctuary of Demeter* came out in 1973. It is still an object lesson in how to identify a cult, for which there

was only one small piece of epigraphic evidence, and its history and possible continuity from, or resurrection of, nearby Minoan cult, by persistent interrogation of the generally scrappy data. Nicolas's persistence, helped by a generous serving of pork bones—a pioneering use of biodata in classical archaeology—and Reynold Higgins's scrupulous study of the figurines, led to a sanctuary of Demeter with cult from the late eighth century BC to the mid-second century AD on the hill immediately south of the Palace of Minos.

After the last season at The Terracottas, Nicolas started his long stint of teaching at the University of London, as a Lecturer at Bedford College for Women. In 1966 he became Reader and nine years later Professor of Aegean Archaeology, until 1983 when he was translated to University College London to hold the Yates Chair of Classical Archaeology, in succession to Peter Corbett, who had said that he would take early retirement if Nicolas took his place. Sir James Lighthill, the Provost, offered him the post over lunch. But those years were not always so easy: there had been the sad and unpleasant closing of Bedford as a place of its own so as to amalgamate it with Royal Holloway College (when Nicolas strongly declined to go there); and he had hoped he might get the Laurence Chair at Cambridge when a successor to Robert Cook was needed in 1976. John Barron, however, who died a few months after Nicolas, was very supportive of his going to UCL, having tried earlier to obtain a personal chair for him at King's College London.

In retrospect, Nicolas did very well by being in London for all his academic career. It brought him a remarkable parade of graduate students, especially from Greece and Cyprus, who were glad to be in the capital as well as to have Nicolas as supervisor. Many colleagues and visitors from abroad came to dine or stay, often as speakers at London's distinguished Mycenaean Seminar—which Nicolas chaired for some twenty years, encouraging his students to attend so as to be completely up to date in Aegean archaeology and philology—or in the case of one *cher collègue*, partly so as to buy his Bordeaux, finding the prices better than in Paris. And not least, London is the heart of British music-making: it meant public concerts galore, and chamber music at home and with the UCL Chamber Music Club.

Nicolas lived at an unusual house: 180 Ebury Street, SW1, where Mozart had stayed as an eight-year-old (as a plaque commemorates) and later Vita Sackville-West and Harold Nicolson lived (for which there is another plaque). In 1970 he married Nicola (Nicky) Carr, a leading scholar of mediaeval architecture and art. It was a blessed union of hearts, minds and warm welcomes: there were many exuberant evenings of trenchant talk, good food and wine, sometimes Nicolas on the piano, robust laughter, *kefi*, and ever bountiful hospitality. Nicolas was rarely without a twinkle in the eye at these happenings, or a deep chuckle at someone's egregious and revealing behaviour. For decades first he, and then he and Nicky, had a famous and lively party after the Annual Meeting of Subscribers of the School in cold February: School hands and their spouses were very welcome.

Life with Nicky led also to many trips abroad, to France and Italy for cathedrals, colleagues, museums, and *dégustation*, and Cyprus, which had as much for mediaevalist Nicky as for archaeologist Nicolas, and the United States, where their first trip began in Cincinnati, and they were soon much in demand. And there was always Greece. He loved the people and the resilient spirit of place of both Greece and Cyprus, but perhaps dearest of all were Crete and Knossos. Decades after studying and publishing the sanctuary of Demeter, and the Iron Age upper deposits in Sinclair Hood's excavations, he was doing the same for Hugh Sackett's excavations above the Minoan Unexplored Mansion, Colin Macdonald's outside the

southwest corner of the Palace, and Eleni Hatzaki's under the Villa Dionysos. In the meantime there had been a far greater undertaking. The massive rescue excavation led by Hector Catling, as Director of the School, in 1978 on the ridge just north of the Venizeleio Hospital of a large and important Iron Age cemetery led to an equally large and important publication: J. N. Coldstream and H. W. Catling (eds), *Knossos North Cemetery: Early Greek Tombs* (1996). For Nicolas and Nicky it had meant years of long visits to Knossos, where Nicolas marshalled the pots and Nicky drew many of them.

If the main task was to co-ordinate, and prod, the contributors—Nicolas himself, a workaholic with a tidy mind that naturally made order, never needed prodding or co-ordination—and produce what is a remarkable work of editing, there was a bonus in it to add to his work on, say, the ramifications of being a Geometric Euboean or the cultural fertilization between Athens and Cyprus, and many other such topics. Nicolas enjoyed this dividend to the full. Since the North Cemetery, and nearby graves excavated since the 1930s by the British School, are so packed with evidence of the life and culture of Iron Age Knossos, and the city's rich foreign contacts, he now found that he had boundless exciting new material to discuss in a magnificent parade of interpretative articles as rich and varied as a Cypriot *meze*. Indeed, several of them are on the relations of Crete and Cyprus and the stylistic impact of each island on the other, as well as on the hints of a Phoenician or Levantine presence at Knossos, and the important connections with Athenian potting and painting. Others review the slow development of Knossos as a polis (with particular reference to Aristotle), others the reuse of broken bits of Minoan larnakes probably for child burials centuries later, and others the Knossian artists' quirky iconography, best seen in the 'hippalektryon' vessel, found in a tomb with larnax fragments and thirty miniature pots, and surely a toy for the child buried there. In his address on being made a Corresponding Member of the Athens Academy in 1996, Nicolas described this weird animal as

> a combination of horse and bird, covered with every kind of ornament including fish, snakes, and even a Tree of Life down the front of the creature's neck; there is even a diminutive rider, perched precariously in front of the handle. Although less than two centimetres high, his hair and dress are shown in great detail but his facial expression looks just as bewildered as we might be, by this strange form of transport.

This passage is a distillation of Nicolas's scholarship: it was and is human and humane, often humorous, blessed with a probing eye (the painter William Coldstream was his cousin) and a rich visual memory, imaginative and empathetic in his speculations about what the ancient artists, craftsmen, merchants, and patrons thought and chose, and always ready to wonder about how they reacted to, and adapted, exotic ways or exciting new poems—Nicolas relished the likely impact of the Funeral of Patroklos on the conspicuous-consumption burials of Salamis in Cyprus. And he was in the best way ironic in handling evidence, since he was no determinist, sceptical of, as he saw it, theory-based and often facile deductivism, and constantly aware both of what we do not know about the ancients and of the need to allow for human quirkiness in trying to explain them, coupled with a personal, avuncular pride in their extraordinary achievements and progress in the ninth and eighth centuries BC, which he described with lucid elegance. It is a pleasure to read him chronicling their work and resolving their problems. The reader is never in doubt about what he is trying to say and the variety of potential interpretations until, that is, he zeroes in on one of them, and one is left thinking—gasping—'Yes, why not? That's bright. I'd never thought of that.'

Open-mindedness and encouraging students to look at the evidence for themselves and come to realize that they might have an explanation that could be as viable as any professor's made him a much-loved teacher and supervisor, and students came from across London from the other places of learning for his lectures at Bedford and UCL. He is a paradigm of how pupils reveal a person. They stretch from Arizona to Japan, with a high concentration in Greece and Cyprus, where he was much loved. For Cypriots and Cyprophiles he was, for a time, the only person teaching Cypriot archaeology in the UK and had a graduate seminar after the main bread-and-butter lecture of the week, as he did for the Aegean Bronze Age and Iron Age, which he taught deliberately in one continuous course. The Cypriot course, which also spanned Bronze Age and Iron Age, was so successful that Nicolas and ten pupils even published a collective article on 'A Late Cypriot tomb group from Nicosia' (now in UCL) in *BICS* 38 (1991–3). Nearly all his graduate pupils showed how he had been their Tree of Life (or Tree of Jesse) in his Festschrift, C. Morris (ed.), *Klados* (1995), and continued after his retirement to ask him for references or keynote lectures at the conferences they organized, or send him work to critique.

Once based at Bedford, he was soon recruited into the British School's home guard of volunteers on whom much of the UK business depends. The Managing Committee conscripted him in 1967: he stayed on it until 1998, when he was elected Vice-President. In the meantime, he edited the *Annual* for five years from volume 64 (1969), became the appointee of London University on the Committee in 1976/7, a Trustee in 1983/4 (succeeding Bernard Ashmole), and Chairman for four years from 1987/8 (to be succeeded by Richard Tomlinson). He took on these demanding unpaid jobs—especially the *Annual* and the Chairmanship—cheerfully and with determination and, in the same spirit, agreed at short notice to run the XI International Congress of Classical Archaeology at UCL in 1978. It was a big success and even made a profit.

During the Bedford years, he and George Huxley excavated for the British School at the basically Minoan settlement of Kastri on Kythera (where Cyprian Broodbank and Evangelia Kiriatzi have followed with the School's Kythera Island Project). Like Nicolas's Geometric studies, it was a pioneering project, in several ways, not all of them obvious. In their prompt publication called *Kythera* (1972) Nicolas, who knew the Bronze Age virtually as well as the Iron Age and was to have many Bronze Age pupils, identified for the first time a pottery style in Late Minoan IB that he christened the 'Alternating Style': it is now a standard usage. More important is the project's place in island studies, since the volume is among the first, if not the first, to tackle an Aegean island and try to see the interaction of people and place diachronically, in this case from the Early Bronze Age to Venetian times: again this has become a standard approach, with striking results in the recent work on Kythera. Last but not least, this was the first British School excavation in which the participants did not have to pay for either their board or their lodging (or both), while contributing their hard work. At Knossos in the 1960s, we were still paying (30 drachmes a day), as may have been (I do not remember well) the case also at Lefkandi; but Kythera pioneered the change, and the two excavations at Myrtos were glad to follow. He also went twice in the Kythera years to the excavations at Motya in Sicily, ostensibly to study the Athenian Black Glaze pottery; but since that did not occupy all his time, the director Ben Isserlin asked him to dig what turned out to be a Phoenician temple at the north gate.

Nicolas was elected FSA in 1964 and FBA in 1977, and received the Academy's Kenyon

Medal for Classical Studies in 2003. At UCL he became an Honorary Fellow on retirement. Abroad, he gave many distinguished lectures and, besides his membership of the Athens Academy, was an Honorary Fellow or member of the Athens Archaeological Society, the Rhein-Westphalia Academy, the German Archaeological Institute, and the Archaeological Institute of America.

Retirement in no way abated Nicolas's zest for work, or music, or travels with Nicky. Articles continued to flow, including the publication a century plus later of pottery from the British School's first excavation in Greece, at Kynosarges; and he edited for the School (with Jonas Eiring and Gary Forster) the *Knossos Pottery Handbook: Greek and Roman* (2001), writing the Subminoan to Late Orientalizing chapter, and the Late Archaic and Classical one with Jonas Eiring, both invaluable synoptic accounts.

For the year or so before he died, he had been looking less strong, although his spirit and scholarly inquisitiveness were unabated, and he tackled undaunted a visit to the rather difficult site of Kalapodi in June 2007, after a conference at Volos organized by Alexander Mazarakis Ainian, another old pupil. But his death from a heart attack was unexpected. He and Nicky had been about to go to Athens for a colloquium at the British School to celebrate *GGP*2, with papers on new work in Geometric studies, many of them by his former pupils. It became a memorial event, and the book appeared a few weeks later. He left several unpublished projects, including a *CVA* volume on the British Museum's Geometric collection—where his scholarly career began.

Nicolas was scrupulously courteous and well-mannered and, I believe, was seen in Greece as one of the best examples of what a British archaeologist should be in that country. His life with Nicky was a true marriage of minds as well as hearts, dedication (not least to the British School at Athens) as well as enjoyment of company, music, and the civilized life. The keen eye, sharp memory and concentration on the human angle that they have both shared bear out the importance and relentless demands in scholarship—as in the rest of life—of what another King's man, E. M. Forster, said: 'Only connect.' Nicolas's life and work did just that.

This son of the Raj died on 21 March 2008, a few days short of his 81st birthday. We were friends since 1960.

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A PRELIMINARY INVESTIGATION OF TWO PREHISTORIC CAVE SITES IN SOUTHERN ALBANIA[1]

Introduction

CAVE and rock-shelter sites are well known as key depositional environments for archaeological and palaeoenvironmental material. Such locations form comparatively low-energy geomorphological environments, favourable to the preservation of sedimentary deposits and the cultural artefacts they contain (Farrand 2001). Like much of the Balkan Peninsula, characterized by a mountainous, karstic topography, prehistoric cave sites in Albania are common, although most lack any integrated, systematic study. However, in recent years a number of important prehistoric projects have been undertaken, most notably at Kryegjata (Runnels *et al.* 2004), Konispol (Schuldenrein 2001), and Sovjan (Petrika and Touchais 2003).

In this paper we describe the prehistoric cultural assemblages from a cave site in the coastal town of Himara, south-western Albania, and from a rock-shelter site at Kanalit in the Acroceraunian Mountains, overlooking the Dukat Valley and the Bay of Vlora (FIG. 1). The current investigations followed an evaluation of records discovered within the archives of the *Istituto Italiano di Paleontologia Umana* in Rome, detailing fieldwork undertaken by the Italian prehistorian Luigi Cardini in 1939 on behalf of the Italian Archaeological Mission to Albania (Gilkes 2005). In 2001, a reconnaissance survey was undertaken to relocate and assess the prehistoric sites originally investigated and described by Cardini (Francis 2000; Francis and Hodges 2003). Having successfully located a number of Cardini's sites, we undertook a further preliminary investigation of the cave deposits at Himara in 2002 and 2003, as the site had come under considerable threat from building work in front of the cave, destroying extensive talus deposits. The rock-shelter deposits at Kanalit were subsequently re-evaluated in 2004.

Geomorphological and Archaeological Background

The cave at Himara is situated within a low limestone outcrop along Spilë beach in the middle of the modern town and forms the largest of three adjacent cavities, located at the base of a low cliff *c.*30 m high and 100 m from the present day shoreline (FIG. 2). Cardini's trial excavations revealed over 2 m of stratified deposits, the basal levels of which contained

[1] Acknowledgements: the 2002–2004 evaluations at Himara Cave and Kanalit rock-shelter were carried out as a joint collaboration between the Institute of World Archaeology (IWA), UEA, Norwich and the Albanian Institute of Archaeology (AIA), Tirana. The excavations were funded by the Institute for Aegean Prehistory, with extra financial and logistical support provided by the Butrint Foundation. Survey and excavation work was undertaken by Pete Crawley, Emily Glass, Rovena Kurti, Syrja Lala, Nevila Molla, Jerry O'Dwyer, and Rudence Rucha. We are also extremely grateful to Lorenc Bejko and Maria Grazia Amore of the ICAA, Tirana for the kind loan of their vehicles. The new study of the Himara caves and the Kanalit rock-shelter would not have been possible without the initial help of Professors A. and E. Segre, curators of the Cardini Archive, at the *Istituto Italiano di Palaeontologia Umana* (IPU), Rome. We should also like to thank Curtis Runnels and an anonymous referee for their comments on an earlier draft of this paper.

FIG. 1. Site locations.

FIG. 2. Location of the Himara caves in the coastal town of Himara.

Eneolithic ceramics and numerous flakes of flint and jasper, along with the bones of domesticates such as *Sus*, *Capra*, *Ovis* and *Bos* (Francis 2005). By contrast, the Kanalit rock-shelter is situated at an elevation of 140 m above sea level on the north-east-facing flank of the rugged Acroceraunian Mountains *c*.40 km north of Himara (FIG. 3). The Acroceraunian Mountains consist of inclined massif beds of Triassic and Jurassic limestone, uplifted and folded by compressional tectonic events during the Late Jurassic to Eocene and reach elevations in excess of 1200 m. The north-eastern flank overlooking the fault-bound Dukat valley is deeply incised by a network of drainage gulleys, often giving way to extensive alluvial fans towards the base. At Kanalit, Cardini excavated two trenches, the largest of which was placed inside the rock-shelter. The excavations recovered Eneolithic flint tools, hand-made ceramics, hearths and animal bones of domesticated species including *Sus*, *Ovis*, and *Bos brachyceros*, a domesticate common in Neolithic and Copper Age deposits throughout the Mediterranean (Francis 2005).

Himara: Setting and Excavation

The largest cavity at Himara is over 30 m long with an irregular opening *c*.8 m wide and 7 m high, facing west to south-west at an elevation of 3.6 m above the present-day sea level. The cave has formed as a result of karstic processes, the entrance being further enlarged by wave action. The triangular planform of the cave was surveyed using a total station and is illustrated

FIG. 3. View of the Acroceraunian mountain range (facing south), showing the location of the Kanalit rock-shelter.

in FIG. 4. The limestone beds forming the cave walls are tectonically deformed, dipping *c.*20° eastwards and are of a fractured and brittle nature, with high bedding and joint frequencies. There is a large fissure in the roof towards the front of the cave packed with irregular, poorly sorted clasts, suggestive of a collapsed solution feature. At the rear of the cave a long, narrow water-worn passage runs at a shallow angle downwards into the bedrock. Several well-developed stalactites are present towards the rear of the cave with fairly extensive calcite deposition on the back wall. The infilling deposits are level, forming a surface of compact dark brown silt and poorly sorted angular limestone clasts, *c.*12 m below the roof. The general character of the clastic deposits within the cave are of limestone debris of varying size, forming unconsolidated and poorly sorted deposits within a predominantly silt grade matrix. A deposit of cemented, moderately sorted gravel composed of well-rounded pebbles was recorded sloping away from the rear of the cave.

EXCAVATION

A 3 × 3 m test pit was excavated along the northern wall of the front section of the cave as indicated in FIG. 4. The location was chosen to coincide with an area of the cave likely to contain anthropogenic material, being a place of good natural light and, while sheltered from the prevailing wind, having a good view of the cave's vicinity. Each deposit was excavated in alternate 1 m² spits corresponding to the trench grid survey squares. All excavated deposits were dry-sieved to aid finds recovery, while 20% of all deposits were subject to wet-sieving, allowing the recovery of environmental samples (currently under investigation). All archae-

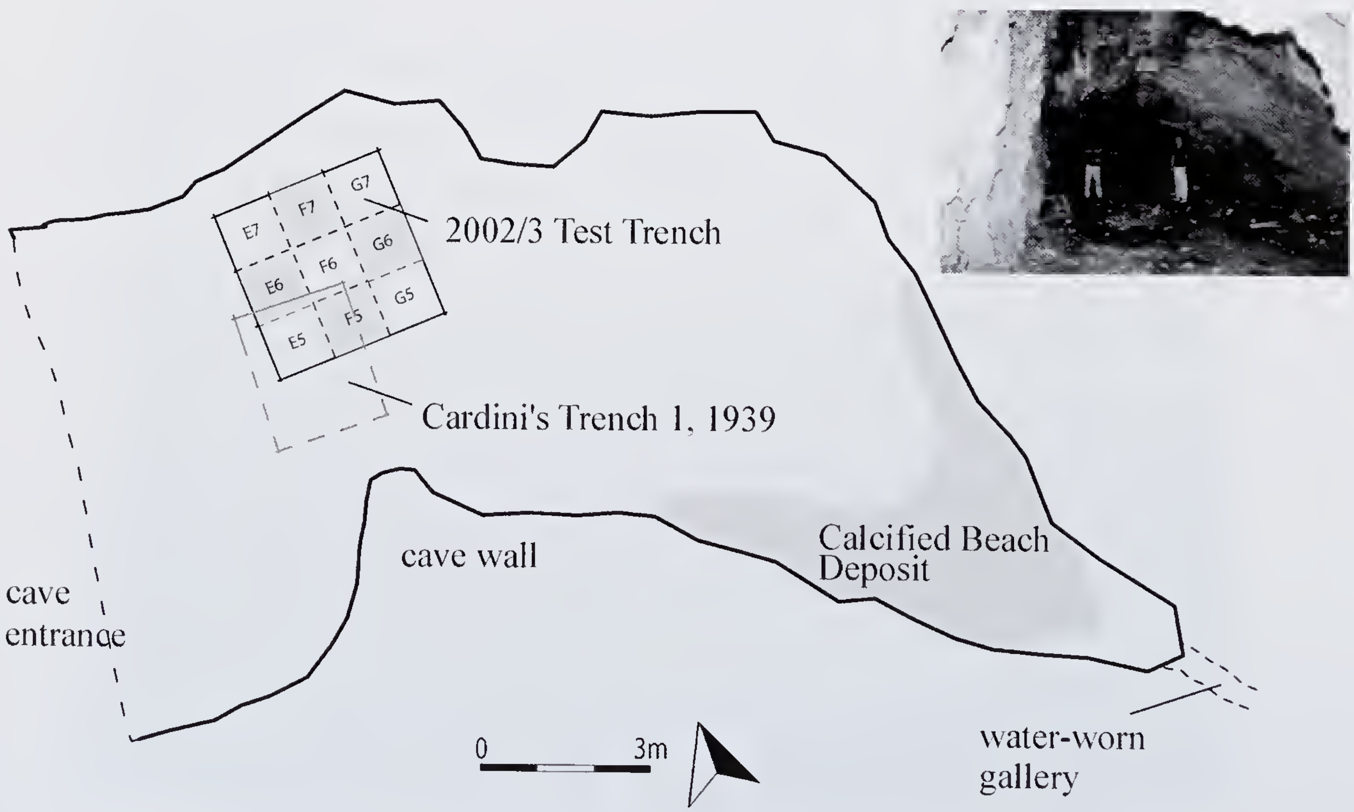

FIG. 4. Plan of Himara Cave, showing location of test trench. Inset photograph shows view looking into cave mouth.

ological features and finds were recorded three-dimensionally. A total of 100 deposits were excavated, including a number of hearth and posthole features. The excavation was also successful in locating Cardini's original trial trench, the position of which is indicated in FIG. 4.

Sedimentological Interpretation

The sedimentary record at Himara reflects both cultural activity within the cave and underlying palaeoenvironmental conditions. To evaluate this interconnection, a detailed description of each sedimentary deposit was undertaken, recording colour, texture and the nature of unit boundaries. Within the recorded sequence, it is possible to group deposits into four primary units based on lithostratigraphic properties, summarised in TABLE 1 and illustrated in FIG. 5. Episodes of rockfall and weathering of the cave roof and walls and increased instability through seismic events account for much of the clastic sedimentation, which remains fairly constant throughout deposition. The bulk of sediments excavated do not appear to have been significantly altered by natural diagenetic processes.

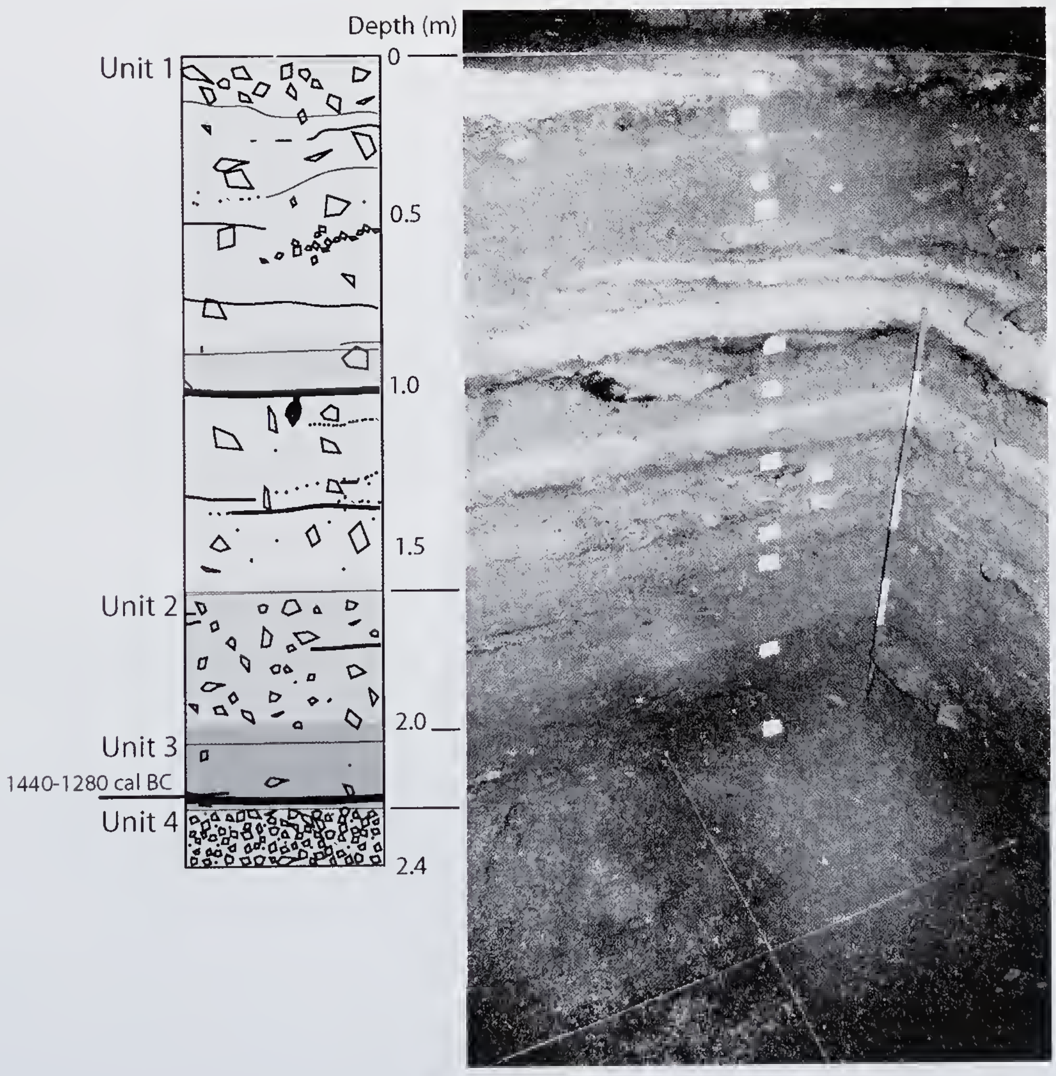

FIG. 5. Himara Cave, south-east facing section through excavated deposits, showing division of lithostratigraphic units.

Cultural Stratigraphy

Several distinct cultural phases can be identified within the excavated deposits, based primarily on artefact typology. Within the basal gravels (Unit 1; see TABLE 1), several small abraded lithic pieces were recovered (FIG. 6), although these are not considered culturally diagnostic.

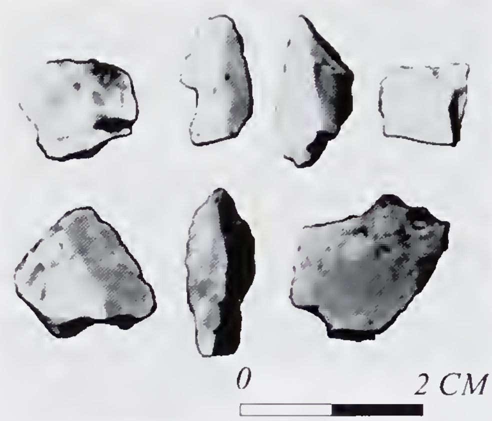

FIG. 6. Lithics recovered from basal gravels (Unit 1).

Overlying the gravels and associated with a thin ash layer and stakehole feature, the cultural assemblage from the base of Unit 2 consisted of 228 g of pottery and 200 g of animal bone fragments. Over 30 lithic artefacts, including jasper and chert flakes and a core fragment, were also recovered (see FIG. 7). The ceramic fragments are represented by both thick- and thin-walled vessels, the latter being of good quality production with clay slip surfaces, which have been burnished and are well fired. Two rim sherds indicate a vessel with a cylindrical neck and an everted rim (FIG. 8). Amongst the large vessels is a fragment with a 2 cm-wide raised edge or band, which might have served as a handle (FIG. 8). The raised edge is decorated with a continuous line of impressed holes, a technique of decoration that appears in the early Bronze Age and continues into successive phases. Radiocarbon dates of 1440 to 1280 cal BC (Intcal98) were obtained from charcoal contained within the associated ash layer. While the potential limitations of the dated context need to be considered, the date nonetheless provides an independent chronological marker that confers a late Middle Bronze Age/early Late Bronze Age date range for this material.

Ceramics from the uppermost portion of Unit 2 are handmade and assumed to be of local origin. The fragments mostly relate to well-fired medium or large vessels; thin-walled vessels are rare. A number of rim profiles, necks, bases, and handles present indicate rounded vessels with short cylindrical necks, as well as medium- and large-sized vessels (see FIG. 9). Rims are

TABLE 1 Preliminary lithostratigraphic units recorded at Himara.

1	Thick sequence of deposits of brown silty loams with up to 15% angular limestone clasts, containing numerous compact ash lenses and organically enriched horizons of anthropogenic activity, often related to hearth features.
2	Thick deposit of fine silty clay sediments of a distinctive red colouring, containing up to 10% small angular to subangular limestone clasts. The presence of weak laminae within this deposit suggests the possibility of seasonal ponding. It is likely that these sediments are derived from *terrarossa* soils ubiquitous on surrounding slopes, possibly infiltrating the cave with ground water percolating in from fissures in the roof, the cave acting as a sink for fine, surface derived material.
3	Thin deposits of dark grey brown, moderately compact silty loam. Two radiocarbon dates were derived from charcoal fragments within a thin ash lens within this unit, giving dates of 3090 ± 40 bp and 3100 ± 40 bp (Beta 187243/4).
4	Basal deposits composed of poorly sorted gravel of subrounded to subangular stones of varying lithologies, supported in a loose sandy matrix. The overall thickness of this unit is unknown, although in excess of 1 m within the test trench. This unit is likely to represent the former distal extent of the Holocene littoral zone. The current sea level is 1.2 m below the top of this unit.

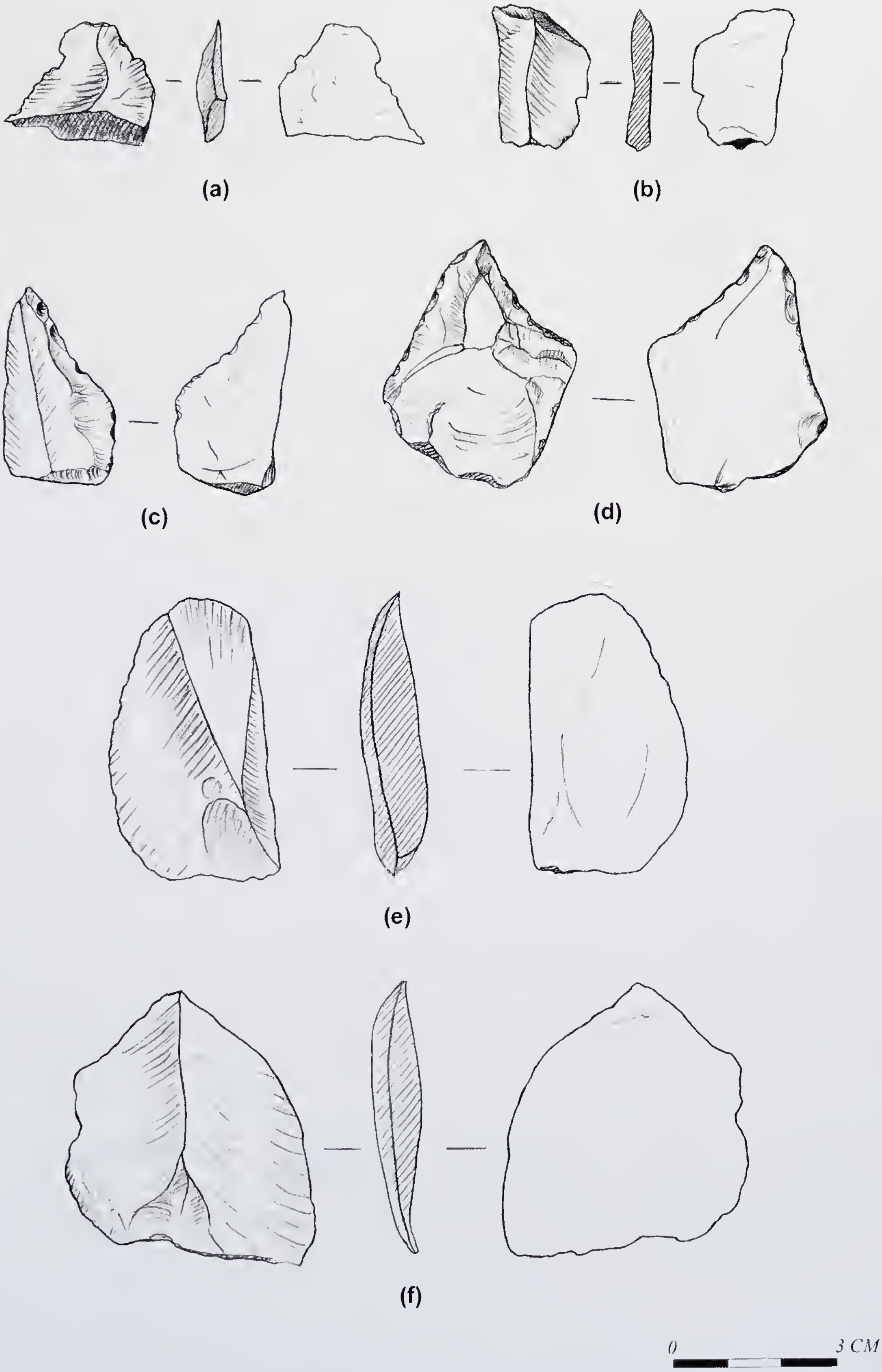

FIG. 7. Middle Bronze Age lithic material recovered from Unit 2: (*a*, *f*) flakes; (*b*) blade fragment; (*c*, *d*) perçoirs; (*e*) knife.

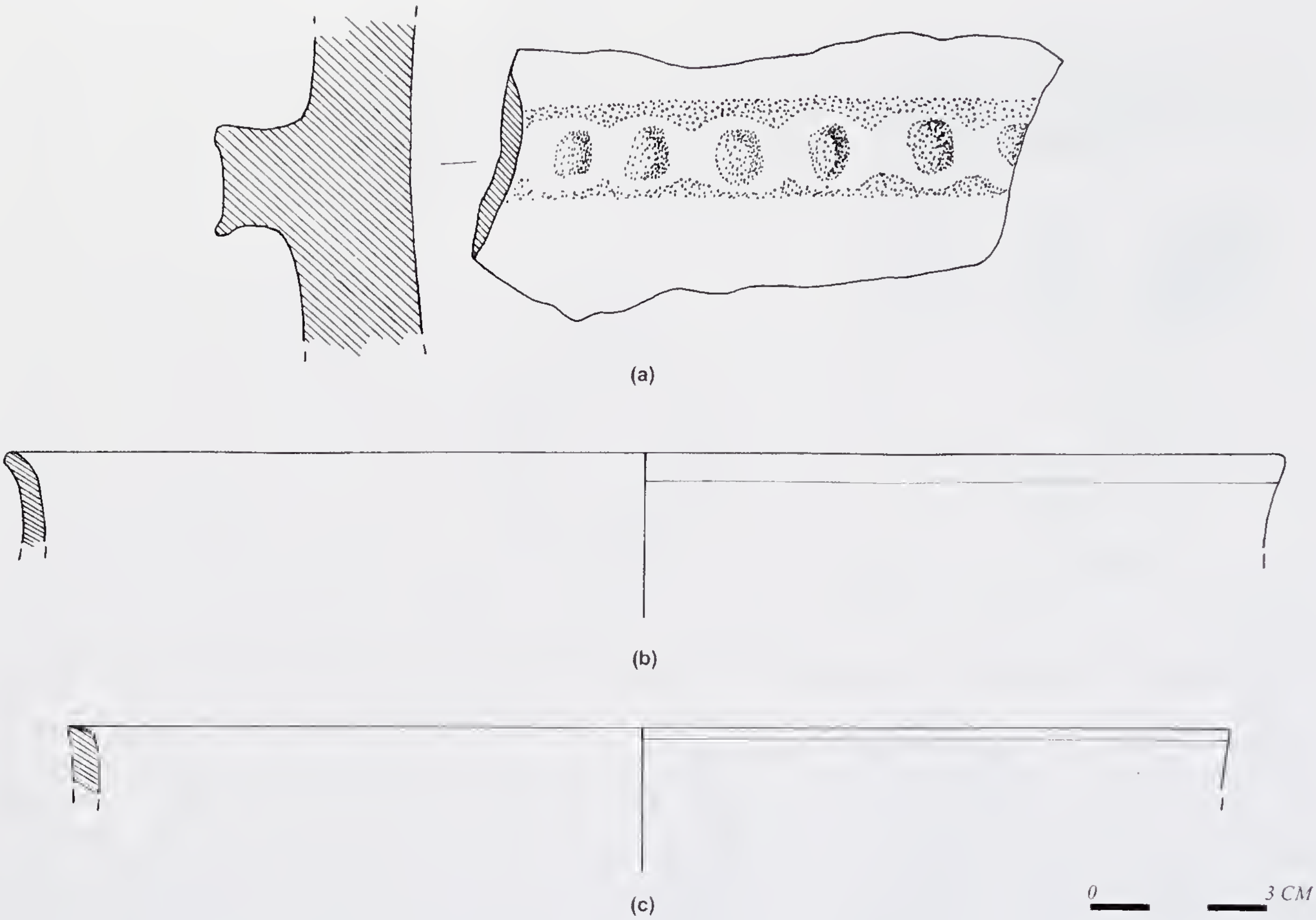

FIG. 8. Middle Bronze Ceramics from Unit 2: (*a*) body sherd with impressed decoration; (*b*, *c*) rim sherds of open vessels, dark brown and reddish grey in colour.

truncated or everted; bases are generally flat; handles, in the form of strips with more or less oval profiles, are positioned vertically or horizontally. Only a few fragments are decorated, including a large long-necked vessel decorated around the body with vertical and horizontal *kanelyra*, and another decorated on the surface with small impressed holes of the same size, in a random pattern. The character of the ceramics suggests that the material dates to the last phase of the Bronze Age or Early Iron Age. The lithic finds are represented by limestone and flint flakes, only two of which show any signs of retouch.

The lower half of Unit 3 is characterized by four post-holes, with over 1 kg of pottery and 740 g of animal bone recovered. Seventy-three manufactured limestone flakes, some blades, and two cores were also recovered. Most of the ceramics from this layer consist of body sherds and appear to be local, although comparative information on the pottery forms is limited. There are, however, a number of body-sherd fragments coated on both surfaces with bitumen; similar pieces have been recovered from Iron Age sites in Albania dating from the eighth–seventh century BC (see Papadopoulos *et al.* 2007). One rim fragment of an open vessel is decorated with impressions made by interlinked fingertip impressions, and dates stylistically to the early Iron Age (see Papadopoulos *et al.* 2007; Lera *et al.* 1996 for comparisons).

The upper cultural layers within Unit 3 contain a hearth feature overlain by 14 post holes.

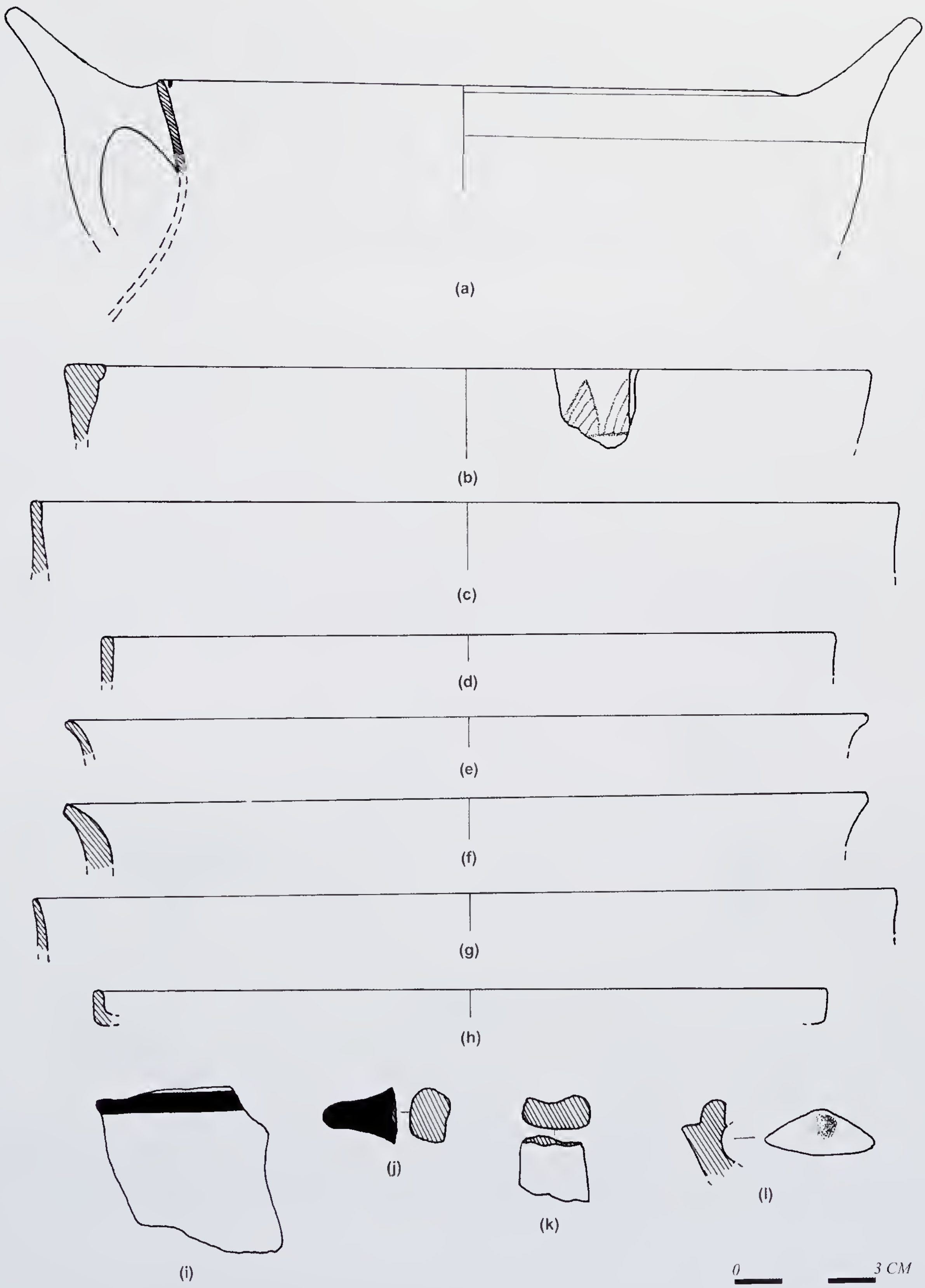

FIG. 9. Late Bronze Age/Early Iron Age ceramics from unit 2: (*a, j, l*) handle fragments; (*b*) rim sherd and incised rim sherd of open vessel; (*c–e*) rim sherds of open vessels; (*f*) rim sherd of casserole; (*g*) rim sherd of bowl; (*h*) profile fragment of plate; (*i*) painted body sherd; (*k*) vessel lug with black slip.

Nearly 1 kg of pottery was recovered, the majority of the ceramics being imported forms with the few local examples, which are of good quality and wheelthrown, suggesting a transfer of technologies from larger, more developed regional centres. This local pottery assemblage manifests characteristics of the late Iron Age, *c.* seventh–sixth century BC. The imported ceramics are predominantly painted finewares (cups, kotylai, skyphoi, kylikes, etc.) and mainly Corinthian and Cyrenaican. Most of them are decorated with slip (brown, light brown, dark brown, red-brown, and red in colour), covering parts of the vessels of the whole surface (see FIG. 10). The painted decoration is mainly represented by parallel horizontal lines or bands below the rim and more rarely by vertical lines and representative of the Archaic period (*c.* sixth–fifth century BC).

The remaining lithostratigraphic unit (Unit 4) contains a record of fairly continuous cultural deposits spanning the Classical to Late Antique/Medieval periods, although stratigraphic integrity was often compromised by high levels of disturbance within this upper deposit. A number of high quality ceramics dating to the fifth and third centuries BC were recovered, including numerous Hellenistic skyphos bases, *vernice nera* (black slip ware) fragments, amphora- and hydria bases, and bitumen-coated ceramics of Apollonian production, dated to the third century BC. Imported pottery is mainly represented by table wares, in most cases decorated with black slip. A quantity of tile was also recovered; their profiles suggesting a fourth–third-century date. Nine small stake holes with largely sterile fills and three hearths, one of which was encircled by several limestone cobbles, were also recorded and broadly dated, given the depositional irregularity of this unit, to the fourth and third centuries BC.

Kanalit: Setting and Excavation

The Kanalit rock-shelter is located within a concavity along the foot of a small limestone cliff. The resulting vertical overhang forms an irregular elongate shelter (FIG. 11, Area 1) of *c.*8 m wide and *c.*2.5 m deep, creating a ceiling that rises from 0.8 m in the south-east to over 2.8 m in the north-west (FIG. 11). The surrounding limestone is a heavily eroded, poorly sorted conglomerate. At the north-western end of the rock-shelter, a short, blank, sub-rectangular chamber (Area 2) is located off the back wall *c.*2.4 m wide, 3.5 m deep, and 3 m high. A similar, small narrow chamber (Area 3) located outside the rock-shelter along the scarp, *c.*2.8 m to the north-west, is *c.*1 m wide, 3.4 m deep, and 1.4 m high. A partial collapse of the overhang has occurred, leaving a large section of detached limestone conglomerate in front of the shelter, indicating the inherent instability of the immediate area. Unfortunately, this block is likely to conceal primary rock-shelter deposits. Along the foot of the scarp, there is a natural terrace of gently sloping ground, forming a relatively flat apron in front of the shelter (Area 4), extending *c.*10 m outwards, and measuring *c.*50 m in width. The immediate area is strewn with numerous angular boulders of varying sizes. Local soils are the typical calcic red type associated with scrub vegetation.

Excavation

The 2004 investigation was aimed primarily at investigating Cardini's claims of prehistoric, specifically Copper Age, settlement within the rock-shelter, and to enable the detailed recording of site stratigraphy as well as the recovery of datable ceramic and lithic artefacts.

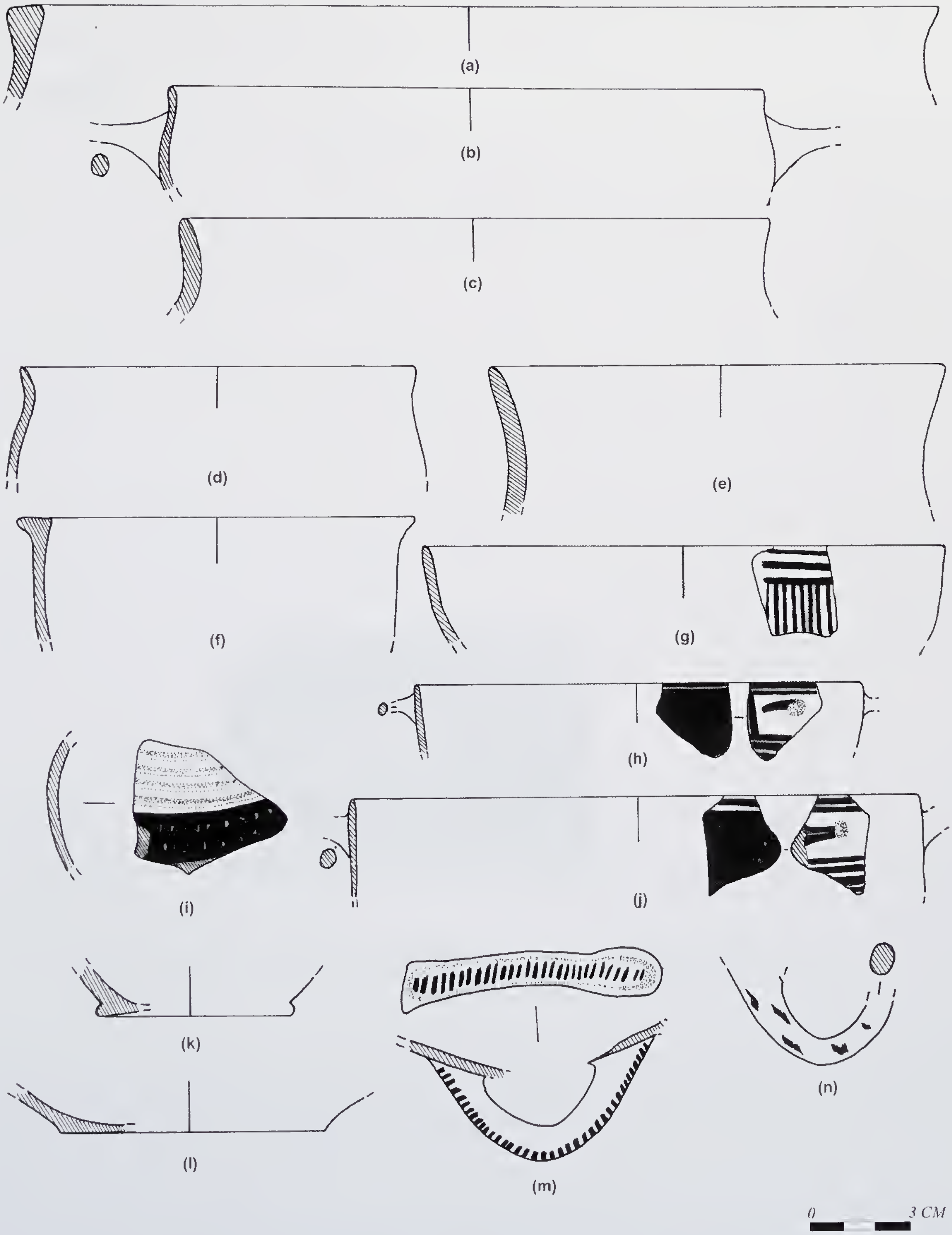

FIG. 10. Rim potsherds and other fragments of imported pottery from the upper levels of Unit 3: (*a–g*) rim sherds of open vessels; (*h, j*) rim sherds of skyphos; (*i*) fragment of decorated body sherd; (*k–l*) base sherds of flat vessels; (*m*) fragment of decorated horizontal handle; (*n*) handle fragment from large skyphos.

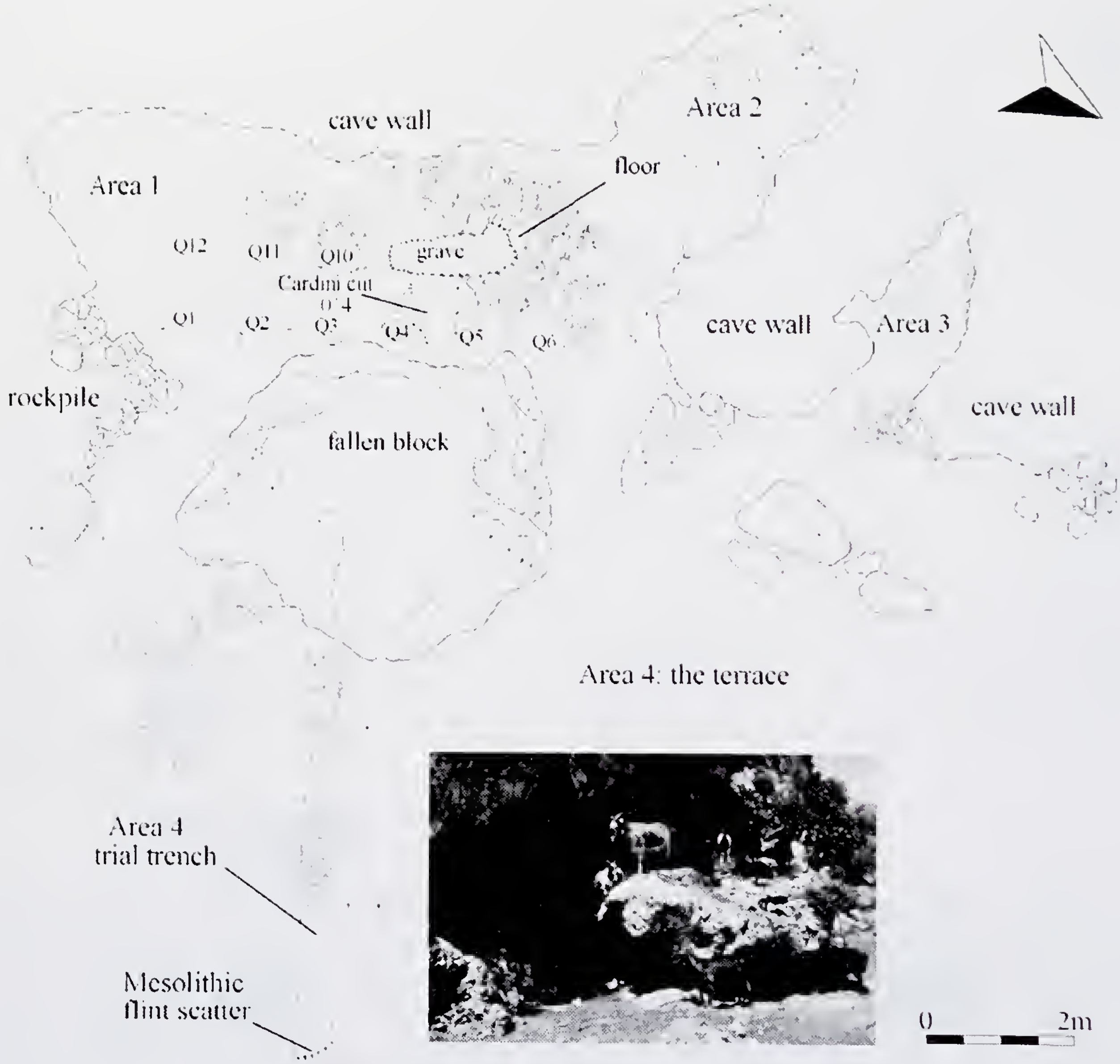

FIG. 11. Plan of the Kanalit rockshelter, showing the location of test excavations. Inset photograph shows north-east facing entrance of the rock-shelter.

The investigation was also aimed at locating Cardini's trial excavations and assessing the degree of survival and nature of deposits on the terrace and surrounding hill slope.

The two smaller cavities (see FIG. 11, Areas 2 and 3) were found to have floors of weathered bedrock, containing no further sedimentary deposits. Consequently the investigation focused upon Area 1, and a 6 × 2 m area laid out (FIG. 11, Q1–12) and deposits excavated in alternate 1 m^2 spits. All archaeological features and finds were recorded three-dimensionally. A total of 25 deposits were recorded, including hearth features and a large pit. The position and extent of Cardini's original trench was identified within quadrants four and five (FIG. 11, Q4 and Q5). A second trench was excavated outside the rock-shelter in Area 4 to examine briefly the terrace in terms of slope, stratigraphy, and archaeology. The trench measured 6 m long and

0.5 m wide, was aligned north-east–south-east (perpendicular to the rock-shelter entrance), extending from the shelter to the break of the hillslope.

Sedimentological interpretation

Weathered limestone bedrock sloping away from the back wall forms the base of the shelter, upon which over 0.5 m of sediments have accumulated, forming a compact, level floor. FIG. 12 (*a*) illustrates the sequence recorded in the north-west section presented by quadrants four and nine (FIG. 11, Q4 and Q9). A detailed sedimentological examination of excavated deposits allowed their division lithostratigraphically into four primary units immediately associated with the rock-shelter and a further two units associated with the terrace, as summarized in TABLE 2. The sedimentary environment here is potentially quite dynamic, with deposition upon the rock-shelter floor occurring either vertically (from shelter walls and ceiling and by percolating water from the land surface above) or laterally by the action of water, wind, and human or animal activity (see Farrand 2001). Important weathering and depositional processes are likely to include freeze-thaw phenomena, sheet wash, and carbonal deposition.

Cultural Stratigraphy

The earliest stratified cultural deposits within the rock-shelter relate to a large, irregular pit feature, cut into Unit 3 (FIG. 12 *a*), where a dark reddish-brown silty loam fill contained a few small animal bone fragments and potsherds of a Bronze Age date. The pit extends eastwards below the fallen block, so that the full profile could not be discerned. This is the only stratified prehistoric evidence from within the rock-shelter. Pottery fragments associated with three ash deposits and a hearth within Unit 3 are late- or post-medieval in date, while the unit is overlain by a rough stone floor containing a grave cut dating to the Second World War.

TABLE 2 Preliminary lithostratigraphic units recorded at Kanalit.

Units immediately associated with the rock-shelter	
1	The uppermost unit comprises a yellow-grey gritty silt containing small limestone fragments and pieces. Unit contains a number of ash lenses associated with a small hearth.
2	Extremely compacted, semi-cemented dark yellow layer of angular limestone fragments within a clayey silt, confined to the eastern edge of Area 1 and extending away from the drip line of the shelter. This unit contains a large pit of prehistoric date.
3	A similar, sterile layer of small cemented limestone fragments within a green-brown sandy matrix and seemingly confined to the eastern side of Area 1, sloping downwards. The cementation of the deposits may relate to changing climate and wetter warmer conditions, as recorded at the onset of the Holocene.
4	Basal deposits of partially cemented limestone conglomerate supported by an orange clayey silt matrix and relating to the autogenic evolution of the rock-shelter, and sterile of cultural material. Possibly corresponds to cold, dryer conditions which characterized the end of the Pleistocene *c.*12,000 bp. The quantity of poorly sorted angular limestone clasts suggests the mechanical erosion of material from the shelter roof and walls as a result of freeze-thaw action.
Units associated with the terrace	
5	A thin deposit of Colluvium composed of mid-brown sandy silts, containing frequent small–medium limestone clasts, fining downwards. Along the edge of the terrace, this unit is darker in colour and more organic, reflecting deeper soil development.
6	Basal deposits similar to Unit 1, consisting of a highly compacted layer of weathered limestone within a silty clay matrix, overlying the bedrock.

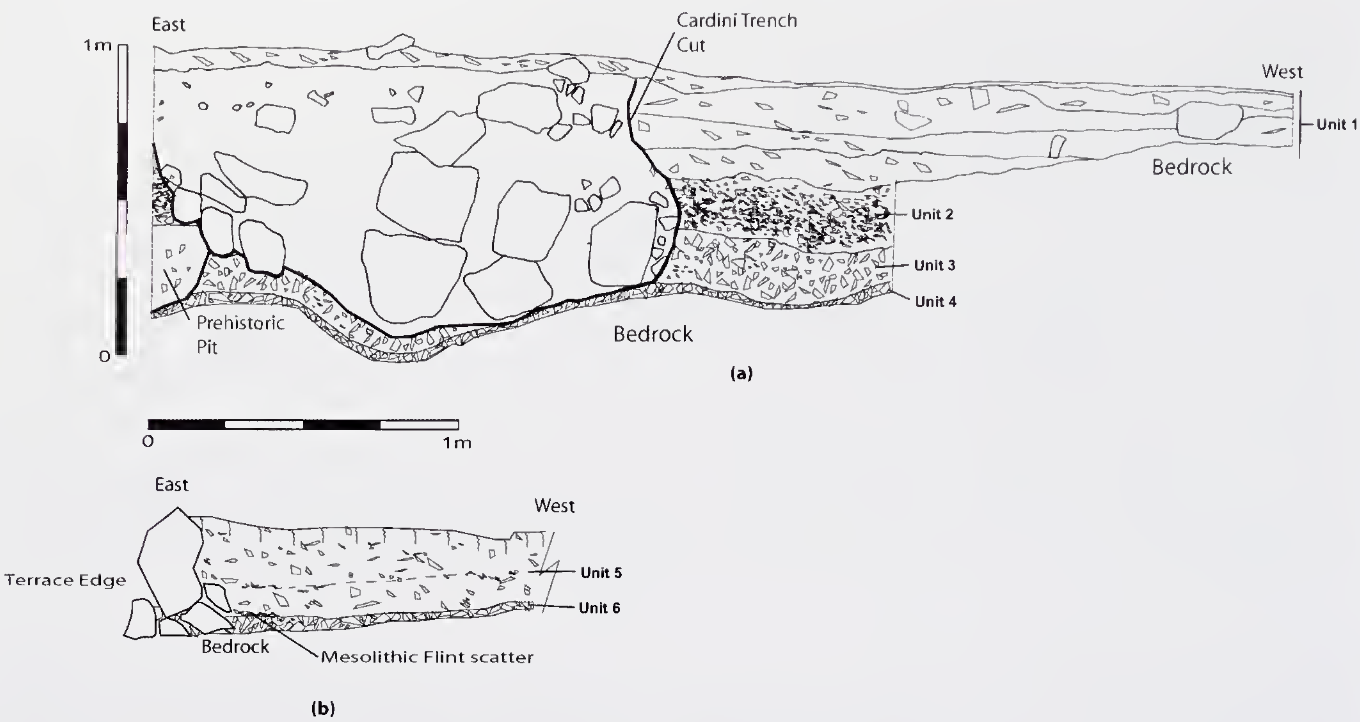

FIG. 12. (*a*) North-west facing section through excavated deposits within the rock-shelter, showing division of lithostratigraphic units defined in this study. (*b*) North-eastern portion of section through the terrace, showing lithostratigraphic units and position of Mesolithic artefacts.

The most significant cultural assemblage came from the terrace edge within the base of Unit 6, where 125 knapped flints were discovered (see FIG. 13). A breakdown of the assemblage composition by artefact typology is given in TABLE 3, although it should be noted that the full extent of the assemblage was not mapped. There were 16 bladelets with an average size of 3 cm in length. Some of these pieces had been retouched to form scrapers, *perçoirs*, and burins. The largest (FIG. 13 *g*) has retouch at the distal end, forming an end scraper. Medium-sized flakes up to 3 cm in length formed the largest category, with 36 examples. A number of the smallest struck flints (microliths) were manufactured on flake blanks, often displaying fine retouch. Two core fragments, a number of retouching flakes, and some débitage were also recorded, suggesting that flint-working may have taken place on the edge of the terrace nearby. All of the pieces found were unrolled and unpatinated and of an extremely fresh appearance, suggesting that they had not been eroded or accumulated from elsewhere on the site. No associated animal bone assemblage was recorded. The assemblage is best described as Mesolithic, bearing similarities to industries from the open air coastal site of Kryegjata B in the Fier District *c.*20 km to the north (Runnels *et al.* 2004).

Discussion

Deposits recorded from Himara and Kanalit indicate the presence of prehistoric human activity dating as far back as the Mesolithic period. At the coastal cave site at Himara, it seems plausible that the basal gravels (Unit 1) were deposited during the mid-Holocene sea-level transgressive maxima, *c.*6500 BP (Jing and Rapp 2003; Ciavola, *et al.* 1995) and that existing

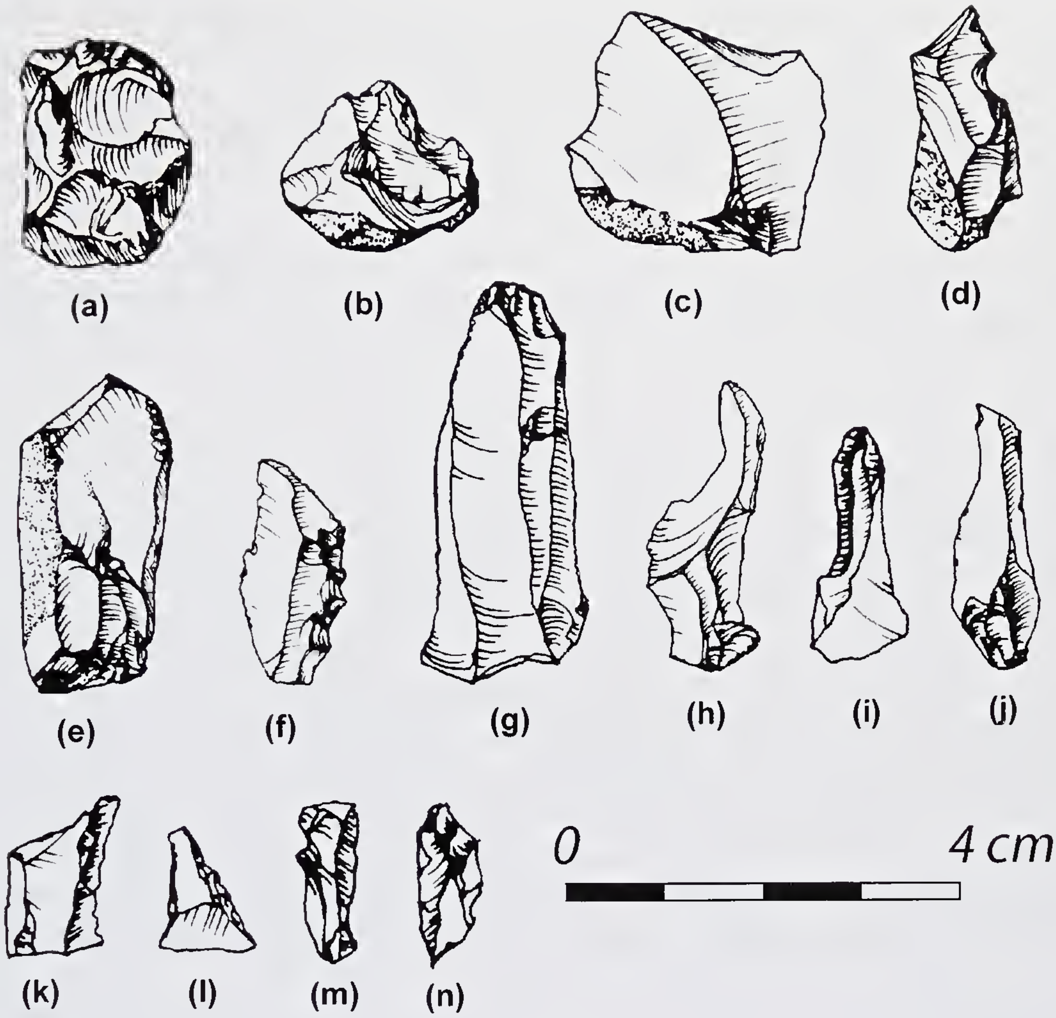

FIG. 13. Selection of Mesolithic flint blades recovered from the terrace edge (Unit 6): (*a–b*) cores; (*c*) flake ?knife; (*d*) notch; (*e*) combination tool; (*f*) burin/sidescraper; (*g*) endscraper; (*h–i*) perçoirs; (*j*); burin (*k–n*); microliths.

TABLE 3 Lithic assemblage composition for Unit 6.

Category	Number
Core	2
Flake	36
Blade	16
Retouched piece	11
Débitage	41
Sidescraper	2
Endscraper	2
Burin	2
Perçoir	2
Notch	2
Combination tool	1
Microlith	8
Total	125

deposits accumulated within the cave would have been flushed out by the rising sea. This is unfortunate, since evidence of Upper Palaeolithic exploitation of the coastal plains, recorded at a number of sites to the south (see Runnels and van Andel 2003) may have been lost. A more precise age estimate for the deposition of these basal gravels remains problematic, since tectonic influences also need to be taken into account and no obviously diagnostic cultural material recovered.

At Kanalit, rising Holocene sea-levels would have resulted in the steady transformation of the low-lying, distal portion of the Dukat Plain into a coastal embayment, of which Lake Pasha Limani represents a remnant phase (see Mathers *et al.* 1999). The change in local environment within the valley to encroaching coastal wetland would have afforded new subsistence opportunities along the valley margins. The flint assemblage at Kanalit is indicative of active flint-knapping, with the objective of the reduction strategy to produce small bladelets, used as blanks for the manufacture of retouched tools. The location of the site forms a natural vantage-point, sitting on the edge of the elevated terrace overlooking the valley bottom, and may well have formed a strategic location for the exploitation of new resources.

Geometric microliths, like the few distinctive tools found at Kanalit (FIG. 13), are known from just a handful of sites in Albania, including Vlushë in the south-east (Korkuti and Petruso 1993) and Konispol Cave, close to the Albanian–Greek border (Harrold *et al.* 1999, 369). The latter site is dated by radiocarbon to within several centuries before 6000 cal BP (ibid.). Another site, Kryegjata B, has recently been discovered as a result of survey work and excavation carried out close to the ancient city of Apollonia to the north. Early Holocene activity at this open air site, which comprised almost 1000 Mesolithic artefacts manufactured from flint of local origin, is dated slightly earlier to between *c.*10,000 and 8000 BP (Davis 2004). Both Konispol and Kryegjata occupy similar coastal zone environments to the Dukat Plain.

BRONZE AGE HIMARA

The radiocarbon dated layers from Himara provide an independent chronological marker for the MBA–LBA transition, adding to a growing regional chronology emerging from sites such as Sovjan in the south-east of Albania (see Petrika and Touchais 2003). The period coincides with an apparent increase in anthropogenic activity throughout the central Mediterranean, recorded within number of pollen records from north-west Greece, showing a marked decrease in woodland and increased instances of soil erosion from 4000 BP (Willis 1992*a*; 1992*b*). Similarly, the pollen sequence from the Bronze Age and Iron Age settlement at Sovjan indicates a major shift from a fir-dominated to an oak-dominated forest at *c.*4000 BP, coincident with an increase in cereal pollen and other herbaceous indicators of agricultural activity (Allen 2002).

At Himara there is tentative sedimentological evidence for changing environmental conditions towards the end of the Bronze Age, possibly induced by climatic fluctuations leading to wetter conditions (Unit 3), although changes to the local hydrology such as increased erosion and slope run-off through deforestation need to be considered. The interaction between climatic fluctuations, hydrological, and anthropogenic factors is likely to be subtle and complex (see Brown and Ellis 1995).

The Bronze Age ceramics at Himara show a predominance of local fabrics; it is not until the onset of the Iron Age and the beginning of the Archaic period that imported wares

dominate, indicating that by this time the area was very much part of regional trade networks. A technological shift to wheelthrown pottery production is also observed locally. The lack of earlier Mycenaean influence is interesting, although not altogether surprising, as a similar lack of Mycenaean presence is recorded on Corfu (Wardle 1997). The local Bronze Age coarsewares with finger impressed and incised decoration share many similarities with regional (Epirote) pottery from sites such as Dodona in north-western Greece (see Wardle 1977). While it is potentially unwise to regard the ceramic assemblage at Himara as typical, since cave sites are often ascribed functions that may colour the assemblage, no evidence to suggest specific usage outside general domestic habitation has been found.

Conclusion

The preliminary investigations at the cave site at Himara and the rock-shelter at Kanalit in south-west Albania represent a rare opportunity to evaluate the survival of prehistoric remains within a region where systematic prehistoric research has been sporadic. Evidence for the Mesolithic exploitation of coastal lowlands surrounding Kanalit reinforces an emerging regional trend recorded from sites to the north and south (e.g. Konispol and Kryegjata), adding to the small number of documented Mesolithic sites in Albania.

Geographically, the region has always been of strategic importance, often forming a crossroads of cultural influences, particularly from the east and south, and the ceramic evidence from Himara forms a useful indicator of regional connections to trans-Mediterranean trading routes from the early and middle Bronze Age. The predominance of well-made local ceramics suggests the region was relatively insular in terms of trading contacts to the south, at least until the beginning of the Iron Age.

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THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS: PRELIMINARY REPORT OF THE 2008 EXCAVATION SEASON[1]

Introduction

In the 2008 field season of the Cambridge Keros Project, the Early Cycladic settlement on the small islet of Dhaskalio, opposite Dhaskalio Kavos on the Cycladic island of Keros, was more fully investigated and documented (FIG. 1; PLATE 1 *a*). It can now be recognized as the largest known settlement site of the period in the Cyclades. Dhaskalio has extensive buildings of laminar stone construction. Amongst these, on the summit of the island, was a substantial structure, some 16.1 m in length, as large as any other known structure of the Cycladic Early Bronze Age (EBA).

Work undertaken at Dhaskalio during 2007 was reviewed in the first preliminary report (Renfrew *et al.* 2007*c*, 128–31). It was then established that Dhaskalio was the site of a major settlement of EBA date, with the small church at its summit as the only significant indication of more recent activity, as the earlier work of Doumas (1964) had already suggested. The investigation of the Special Deposit South lying opposite, at Dhaskalio Kavos on Keros, was the major undertaking for the 2006 field season, the first of the Cambridge Keros Project. It was

[1] The Cambridge Keros Project is directed by Colin Renfrew with Olga Philaniotou as Associate Director, Giorgos Gavalas and Neil Brodie as Assistant Directors, and Michael Boyd as Niarchos Research Fellow. It is a project of the McDonald Institute for Archaeological Research of the University of Cambridge, with generous support from INSTAP (Institute for Aegean Prehistory), the Balzan Foundation, the Stavros S. Niarchos Foundation, the British Academy, the Society of Antiquaries of London, and the British School at Athens. The Project is grateful to the British School at Athens and its Director, Professor Cathy Morgan, for making application to the Greek Archaeological Service for a permit to excavate, and to Dr Marisa Marthari, Director of the 21st Ephorate of Prehistoric and Classical Antiquities, for her encouragement and help in many ways. Excavation work was conducted from Monday, 5 May to Wednesday, 18 June 2008.

The excavation team included the following: Camilla Briault, Artemis Brofidou, Peter Church, Chloe Duckworth, Eugenia Gatzogia, Clare Kelly-Blazeby, Morag Kersel, Judit Lebegyev, Rita Letrud, Thomas Loughlin, Victoria McGuiness, Pat Marsh, Will Megarry, Barry Molloy, Ben Moore, Ioanna Moutafi, Rebecca Mullin, Helen Murphy, Gry Nymo, Stavriani Orphanou, Scott Rogerson, David Smith, Ilias Tsouktatos and Matt Williams, and with the students of the No. 1 Keros Archaeological Field School (Amanda Berman, Aaron Chapnick, Dana Arrowsmith, Emily Stevens, Erin Thompson, Kelly Brown and Kenneth Gibson). Evangelia Tsavari as phylax represented the Ephor.

The workmen in 2008 included Lefteris Tsavaris (our former phylax), Phanis Lesi, Ioannis Stratoudakis, Viktor Lesi, Valentino Lesi, Nikolaos Nesi and Mario Martinai.

The apotheke was directed by Marina Ugarkovic with the following specialist participants: Tristan Carter and Marina Milić (obsidian), John Dixon (geology and petrology) with a helpful visit from Yannis Bassiakos, Charles French and Sean Taylor (soil micromorphology), Myrto Georgakopoulou (metallurgy), Jill Hilditch, (ceramic petrology), Yannis Maniatis and Dimitris Tambakopoulos (marble), Evi Margaritis with Kyriaki Tsirtsi (flotation and palaeobotany), Evangelia Michou (ceramic conservator), Jane Renfrew (cloth, mat and leaf impressions), Yorke Rowan (coarse stone), Panagiota Sotirakopoulou with Venetia Niarchou (pottery), and Lefteris Zorzos (phytoliths). Pot washing was undertaken by Stella Roussou and Maria Platys.

Survey in the field was undertaken by Bill Blake, Imogen Grundon, Javier Naranjo-Santana and Michael Boyd, with the participation of Kostas Athanasiou (architecture) and Victoria McGuinness. Christophe Gaston undertook kite photography. Ground-controlled helicopter photography was undertaken by Olga Georgoula and Charis Georgiades of the Faculty of Rural Survey and Engineering of the Aristotle University of Thessaloniki (with Vassilis Liakopoulos and Tassos Stamnos) through the kindness of Professor Petros Patias.

We are again grateful to the Platys family for their hospitality at Hotel Sorokos and to Captain Kostas Prasinos for taking the excavation crew from Kouphonisi to Keros and back each day with cheerful efficiency.

continued in 2007, and its completion was one of the principal objectives of the 2008 field season. This was successfully accomplished with the recovery of many more fragments of pottery, marble bowls and other vessels, and again numerous fragments of marble figurines, of which ninety-seven were added to the inventory already recovered in the 2006 and 2007 excavation seasons from the Special Deposit South. Further work on Kavos was carried out in the area lying between this and the original looted Special Deposit (the Special Deposit North: see Renfrew *et al.* 2007*b*). Despite the existence of some walls of rough limestone construction, which could be dated to the EBA, it became clear that the activities in this 'Middle Area' of Kavos during the EBA were of a very limited character. Only in the immediate area of the building excavated by Doumas in 1963 (Doumas 1964) were there finds suggestive of residential settlement.

The surrounding areas overlooking the Special Deposits at Dhaskalio Kavos, including the fissures (or 'caves') in the precipitous and rocky terrain were further explored by Morag Kersel and will be further described in the final report. They do not give indications of extensive use.

The present report will focus mainly upon the researches undertaken on Dhaskalio, leaving further detailed discussion of the Special Deposit South on Dhaskalio Kavos for the final report, now in preparation.

Survey Activities

The steep slopes of Dhaskalio, and indeed of the areas surrounding the Special Deposits lying opposite on Kavos, had made difficult the survey activities in 2006 and 2007. The essential first step in 2006 was the establishment of a sound grid of pegs at 10 m intervals both on Dhaskalio and on Kavos, and this was undertaken by Joseph Severn and formed the basis for subsequent excavation work. The excavations in the Special Deposit South were undertaken using this grid. During 2007 a total station survey of Dhaskalio and Kavos was initiated by Imogen Grundon and Neil Brodie, and this was further developed under her leadership and that of Bill Blake in the 2008 season, with the participation of Michael Boyd, Javier Naranjo-Santana and Victoria McGuinness. The resulting contour survey with the inclusion of all walls observed on the surface will provide a secure basis for all further work on the site (FIG. 1).

The survey of the excavated areas within the excavation trenches was undertaken by the trench supervisors, co-ordinated by Michael Boyd, who also compiled a wall catalogue of all visible surface features over the entire Kavos and Dhaskalio area. One hundred and forty-six such features were noted on Dhaskalio and forty-two on Kavos. This survey gave definitive indication of the great extent of the settlement on Dhaskalio (FIG. 2), where the settled area may now provisionally be estimated to be of the order of 7000 m^2—considerably larger than that of Skarkos on Ios or of any other contemporary site in the Cyclades. Extensive traces of walls were recorded in places very difficult to access today, in view of the steepness of the slopes and the loss of considerable parts of structures through erosion and probably through local seismic activity. Structures were built on carefully prepared terraces (like that revealed between Trenches I and II: see below), and the broadly concentric nature of these terrace systems encircling the central spine of the summit area is now clear. At the north end of the island a succession of wall features, running east–west and rising in successive steps, suggests the possibility of a well-planned monumental effect, especially when seen from the north, which will require further study (FIG. 3; PLATE 1 *b*).

FIG. 1. Perspective view of Dhaskalio and Dhaskalio Kavos; contours at 0.5 m and 5 m.

The study of these features was aided considerably by kite and pole photography undertaken by Christophe Gaston. It proved particularly efficient despite the troublesome north wind, which often made working conditions very difficult. Another significant contribution was made by a team from the Department of Rural Survey and Engineering of the Aristotle University of Thessaloniki, led in the field by Olga Georgoula and employing a ground-controlled helicopter. The aerial view of the whole island (PLATES 1 *a* and 2) and many further details thus recorded are contributing to the continuing topographic and architectural studies. More particularly, a photomosaic coverage for both Dhaskalio and Dhaskalio Kavos was achieved and on this basis orthophotographic coverage (and a digital terrain model) at a scale of 1 : 500 will soon be available. In addition, as a pilot project, laser scanning was undertaken using an Optech ILR15 3D scanner. Topographic coverage of Dhaskalio Kavos and the eastern side of Dhaskalio has produced a point cloud with resolution of 15 cm. In addition, Trench I was scanned at a 5 mm resolution.

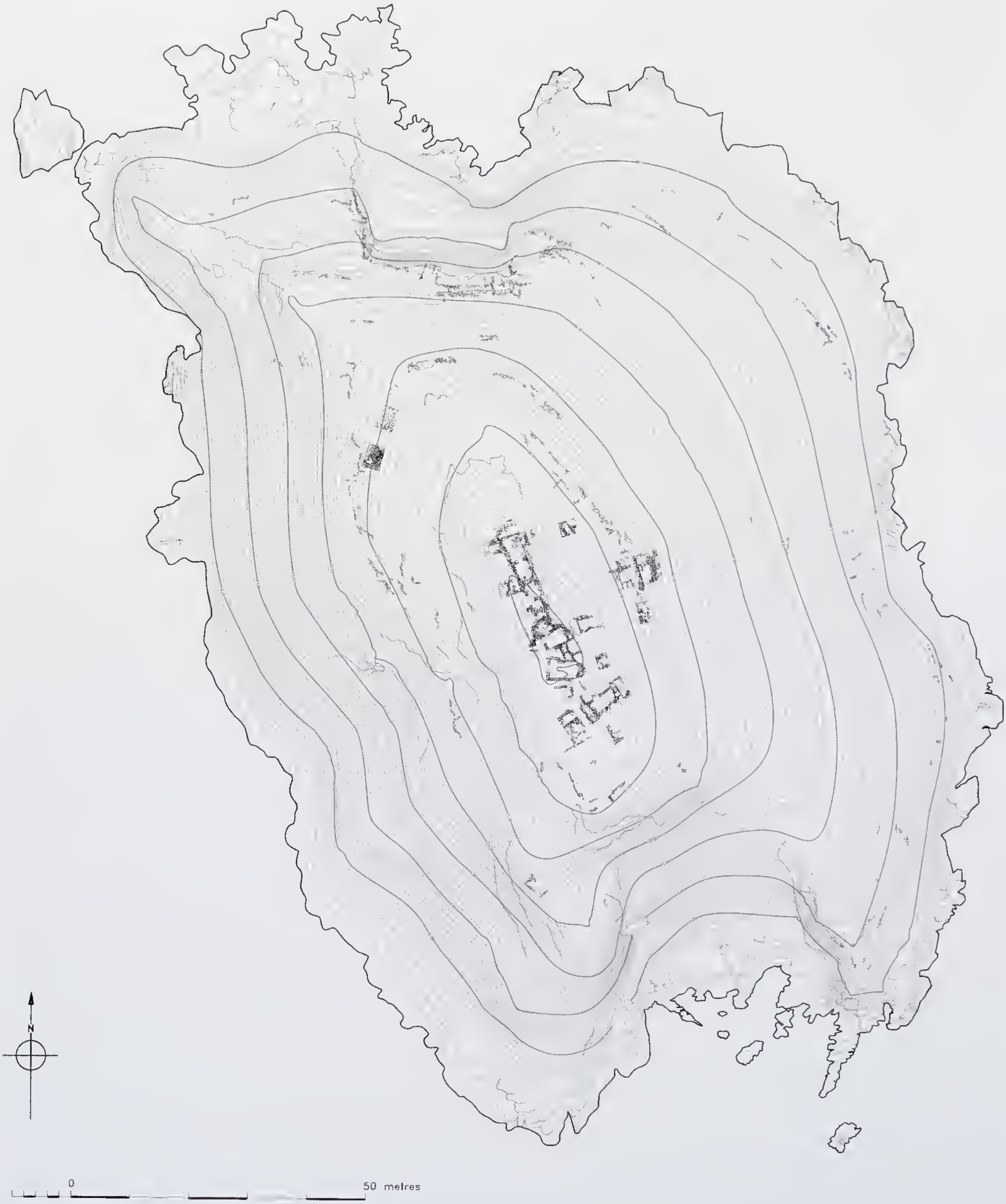

FIG. 2. Plan of Dhaskalio showing walls recorded from the survey and from the excavation, contours at 0.5 m and 5 m.

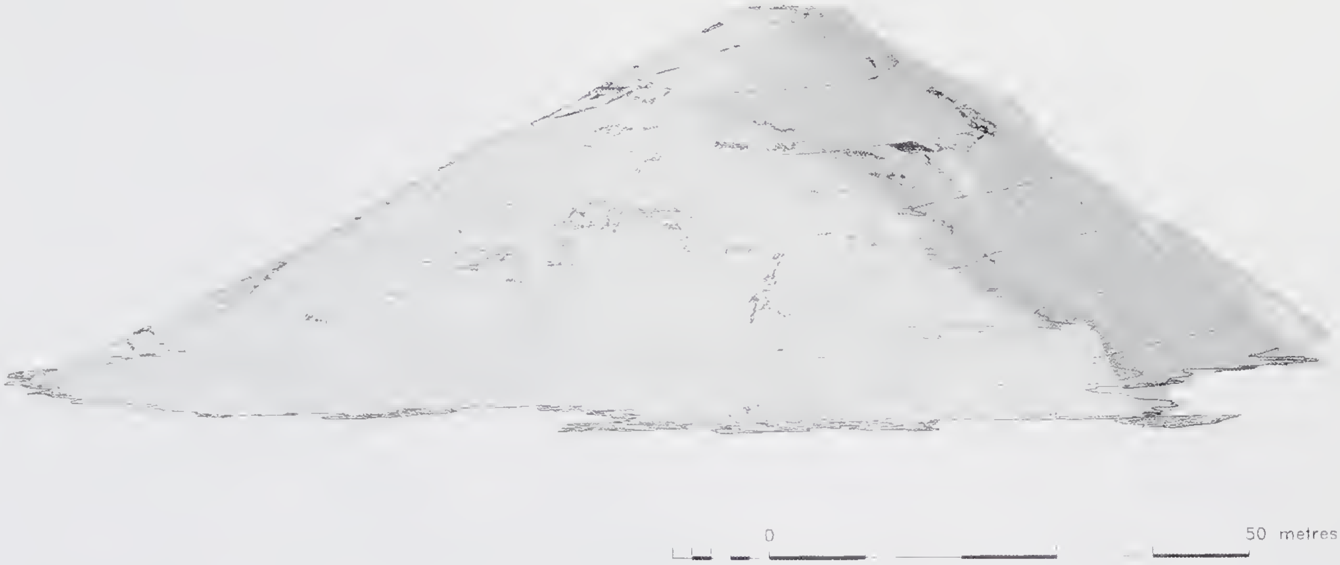

FIG. 3. Perspective view of Dhaskalio seen from the north, showing walls recorded in the survey.

The Excavation of Dhaskalio: The Structural Sequences and an Outline Chronology

During 2007 excavation was undertaken of the massive exposed terracing on the east side of Dhaskalio some 10.5 m below the summit (FIG. 4). As already reported (Renfrew *et al.* 2007*c*, 130), the excavation in Trenches I and II clarified the nature of the retaining wall of massive local limestone boulders, and the well-built stone walling of the room structures in front of it, the stones laid with clay used as mortar, as Olga Philaniotou has observed. The stones used for these domestic structures were of laminar composition (mainly marble and schist) and such materials are not available on Dhaskalio or Keros. Geological survey in the area by John Dixon and Yannis Maniatis confirmed that such building stone is not available on Kouphonisi either. It is, however, abundantly available on south-east Naxos. Some comparable materials were also observed on the island of Schinousa. It is now evident that the bulk of the building materials used at Dhaskalio was imported from other islands, probably mainly Naxos and Schinousa, and that this must have been a very laborious process. The beautifully regular masonry walling achieved from these materials is seen in the interior walls of many of the houses, for instance in Trench VII (FIG. 6). Walling of comparable quality is seen also in Trench I (see Renfrew *et al.* 2007*c*, pl. 4 *a*).

The deep stratigraphy of Trenches I and II offered the first indications toward the overall relative chronology of the site. It is clear that the earliest building remains recovered in them are to be assigned to an early phase of the Keros–Syros culture (Early Cycladic II). No material of the earlier Grotta-Pelos culture or of the Kampos Group has been recovered on Dhaskalio. These buildings and the accompanying finds may be regarded as constituting Phase A of the occupation of Dhaskalio.

Work initiated in 2007 at the north end of the summit area (Trench VI) provided a further important insight into the early use of the site. In the western part of Trench VI, the north end of a large Early Cycladic building (designated the Hall) was investigated. Orientated

FIG. 4. The summit area on Dhaskalio, showing excavation trenches.

north–south, its east and west walls, 3.9 m apart, enclosed a mass of tumbled masonry, which had fallen at the very end of the EBA (see below). Such masonry had also tumbled outwards and downwards from this building (PLATE 7). Two internal walls divide the space into three rooms. The building ends at the north with a semicircular structure. At a depth of 1.8 m below the present surface, the walls of an earlier structure, overlain by the main building or Hall, were revealed. These earlier walls could also be dated to the early Keros–Syros culture and can likewise be assigned to Dhaskalio Phase A.

FIG. 5. Plan of northern summit area, showing the Hall and the Summit Enclosure.

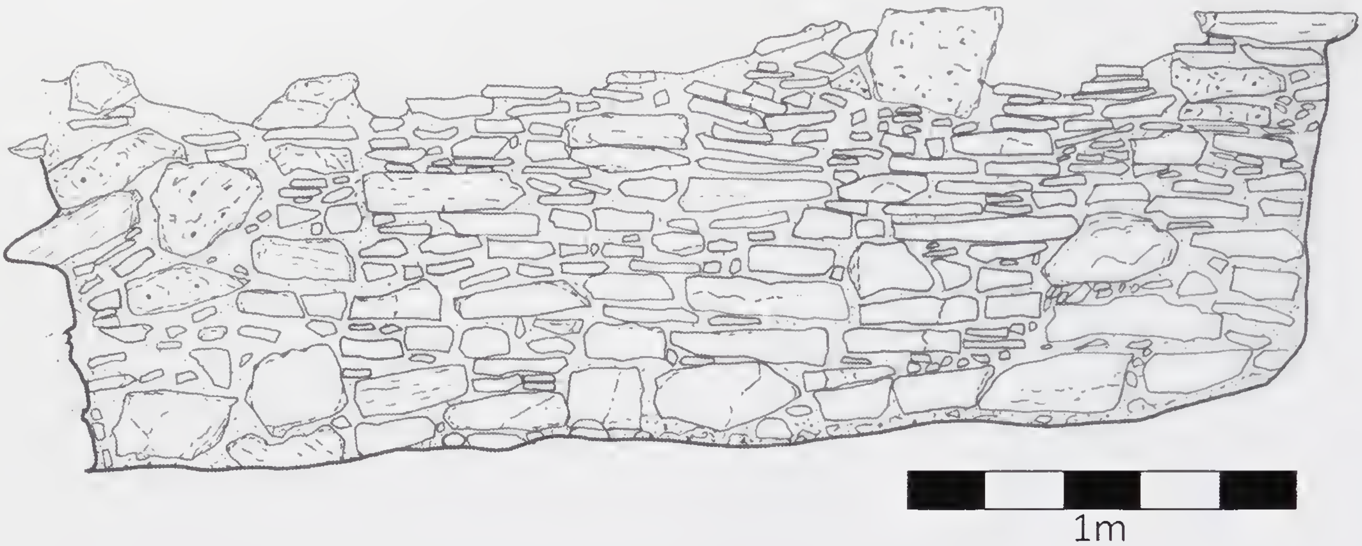

FIG. 6. Stone walling at the east end of Trench VII, seen from the east (drawn by Kostas Athanasiou).

Study of the pottery by Peggy Sotirakopoulou allows the two main constructional phases so far observed at Dhaskalio to be situated in relative chronological terms. The first constructional phase, Phase A, has been identified in the early contexts noted above. The second phase may have seen the construction of most of the buildings evident in the upper levels of the site today, and the bulk of the pottery recovered may provisionally be assigned to Phase C. In most of the rooms excavated, for instance in Trench VII, the pottery can be identified as belonging to a developed phase, which may be regarded as succeeding Phase B. There is continuity of ceramic production and use, and the coarse wares do not yet in themselves permit assignment by phase. Storage jars constitute some 46% of the diagnostic ceramic fragments recovered. The most popular among them are the jar with a cylindrical or concave-profile neck, everted rim, and two horizontal arched handles. Pithoid jars with a flat projecting rim, tubular lug handles below the shoulder and usually with one or two horizontal bands of relief rope pattern decoration below the rim and over the shoulder are also common, along with a range of bowls, baking pans and basins.

A chronologically significant observation is that the pottery of Phase B includes, albeit in small numbers, various forms characteristic of the well-known Kastri Group, including one-handled tankards, depa amphikypella, and other diagnostic shapes (PLATE 6 *a*), including an Anatolian jug with a raised cut-away spout. These generally have a dark brown burnished surface, and the spherical or lentoid pyxides have incised and pointillé decoration characteristic of this group. It is to be stressed that there is continuity in the ceramic assemblage between phases A and B, and that the proportion of these 'Kastri' shapes is not great (up to a count of about ten diagnostic 'Kastri' sherds per thousand sherds recovered). This is a feature which Dhaskalio shares with other sites where sherds indicative of the Kastri Group are found: likewise at Panormos on Naxos, at Markiani on Amorgos and at Kastri on Syros itself their presence is proportionately small. But their presence here allows Phase B to be situated as contemporary with the later phase of the Keros–Syros culture and specifically with the Kastri Group, as originally identified at Kastri on Syros (Renfrew 1972, 533–4) and much discussed subsequently (Sotirakopoulou 1993). The typical Kastri Group shapes seem to have been imports.

Indications of the later phase (provisionally designated Phase C) are found in many of the trenches excavated so far (PLATE 6 *b*). These include the upper levels of the large building or Hall on the summit, both in Trench VI and in Trench XXIV, immediately to the south, and also in Trench XXI, lying further south, immediately south of the apse of the later church. In these locations several interesting later sherds were recognized. Some of these could be assigned to the Phylakopi I culture, best documented at the eponymous site on Melos (PLATE 6 *b*, lower centre), where they fall within Phylakopi Phase B (Renfrew and Evans 2007, 157–76). These included a body fragment of a closed vase with dark-on-light painted decoration with wide bands intersecting vertically, and fifteen body fragments of a jar and jug with painted dark-on-light decoration of cross-hatching (both from Trench XXI, layer 9), and two conical cups with one or two studs some way below the rim (Trench VI, layers 8 and 13).

In the same levels in these trenches were found sherds that, on comparative grounds, might be situated slightly later, at the very end of the Cycladic EBA (and therefore comparable with some materials in Phylakopi Phase C: see Barber 2007). These include red-slipped pithoid jars with successive horizontal ribs on the neck (Trench VI, layers 27–30, 33: PLATE 6 *b* right), black-burnished vases with successive horizontal ribs (Trench XXIV, layers 5–6), a white-slipped spouted basin with red-painted band on the rim (Trench XXI, layer 9), and the spout of a Cycladic White jug (Trench XXIV, layer 6) which might be assigned to the Middle Cycladic period, but which for the present may be regarded as 'transitional' in character. Fabric study of the Dhaskalio ceramics is under way by Jill Hilditch and already her macroscopic examination has shown that the dominant fabric of Phase C is a pale or buff, probably derived from a volcanic source, perhaps Thera. In the pilot study so far undertaken, this represents 31% of the fabrics in Phase C as against 10% in Phase A and 4% in Phase B. As she stresses, it would not be appropriate to make too much of these observations until study is further advanced. Nor does it follow that these trends will be maintained when a larger sample is studied. There is hope, however, that the fabric frequencies may prove as chronologically informative at Dhaskalio as they did in our earlier project at Markiani on Amorgos (Vaughan 2006) and Hilditch's own work on the pottery recovered from the investigations in the Special Deposit North (Hilditch 2007).

It is tempting at this point to undertake some wider correlation of the pottery at Dhaskalio with that from other Early Cycladic sites. But there are grounds for caution here. At Phylakopi the 'Kastri' phase is scarcely represented—or at least not by the characteristic imported shapes seen at Dhaskalio. And the transition from EBA pottery (Evans and Renfrew 2007) to that of the Middle Bronze Age (Barber 2007) is complicated by the paucity of Phylakopi I Dark Faced wares in the recent excavations at the site. At Akrotiri, ware of the Kastri Group is now represented (Sotirakopoulou 2008, 127; Angelopoulou 2008, 161), and the rock-cut chambers revealed during the sinking of pillar shafts, the so-called 'chambers of mystery' (Doumas 2008), have yielded abundant material of Early Cycladic and later date, but the formation processes involved and their stratigraphic status is not yet entirely clear. When the study of the Dhaskalio material by Peggy Sotirakopoulou, supplemented by the petrological analysis of Jill Hilditch, is complete, we shall hope to make bolder chronological claims. At this stage in the study of the material we shall restrict such observations to the summary presented below.

These materials of Phase C on Dhaskalio, the latest on the site, date the use and then the abandonment and collapse of the structures in question, notably the Hall on the summit and

FIG. 7. Marble figurines of Dhaskalio sub-variety, from Dhaskalio (Scale 1 : 2).

the room situated in Trench XXI. It should be noted that there are no indications of any hiatus or 'gap' at Dhaskalio. The impression from the pottery is one of considerable continuity (although, of course, continuity is a feature that is generally difficult to document stratigraphically). These late sherds are clearly imports to Dhaskalio, where the ceramic assemblage is very different from that of what must be the contemporary settlement at Phylakopi (Phylakopi I, or Phase B on the more recent terminology). The impression is therefore one of considerable regionalism at the end of the Early Cycladic period, where the pottery of Dhaskalio differs from that of Phylakopi in Melos or Kastri on Syros, despite the presence of a few imported sherds which make possible the synchronisms observed. As Peggy Sotirakopoulou (pers. comm.) remarks:

> The stratigraphic and pottery evidence from Dhaskalio strongly suggest unbroken occupation of the settlement from the early Keros–Syros phase to the beginning of the Middle Cycladic period, and proves the long-standing and still controversial issue of a supposed discontinuity of life in the Cyclades during the Early Cycladic III period and the existence of a 'gap' in occupation between the 'Kastri phase' and the Phylakopi I culture to be unsubstantiated.

The following outline sequence, based upon the stratigraphic and ceramic observations made above, may therefore be suggested:

Dhaskalio Phase C. Late Early Cycladic (Early Cycladic III), contemporary with Phylakopi Phase B and continuing into early Phase C at that site. Use of the Hall on the summit and other buildings nearby. Following the radiocarbon chronology established for Markiani on Amorgos (Renfrew, Houseley and Manning 2006) one might situate Phase C in calendar years between about 2200 BC and 2000 or 1900 BC.

Dhaskalio Phase B. Later Keros–Syros culture (Early Cycladic IIB or 'Kastri' phase), contemporary with Phylakopi later Phase A2 and early Phase B. Later use of some buildings below the summit area. In calendar years between about 2500 BC and 2200 BC.

Dhaskalio Phase A. Earlier Keros–Syros culture (Early Cycladic IIA or 'Skarkos' phase). Contemporary with Phylakopi Phase A2. First use of the site with buildings in Trenches I and II and on the summit area (Trench VI). In calendar years between about 2800 or 2700 BC and 2500 BC.

Radiocarbon samples are available from various contexts, particularly of Phase C, so it is hoped that an absolute chronology, based upon determinations taken from Dhaskalio, can be established.

The Hall

The principal building on the summit, here designated the Hall (FIG. 5; PLATE 3), occupies the spine of the summit, running north from the four small rock outcrops which serve to define the summit of the island. Its west wall and semicircular north end were clearly visible on the surface before the start of the excavation. In general the west wall is well preserved, the east wall less so since the ground falls away steeply to the east. Excavation has shown that the Hall was some 16 m long and 4 m wide, and entered by a doorway in the southern part of the west

wall (in Trench XIV). The internal space was divided into three rooms by walls running east–west (located in Trenches XXIV and XXX), each with a doorway in the middle.

The southern part of the building incorporates two of the limestone rock outcrops mentioned, one towards the south end of the west wall, and one at the southern end of the building itself, where the east and west walls converge. The bedrock is higher in the south than at the north, and the floor is consequently higher at the south end. There is, as noted, a small east–west wall with a doorway 2.5 m north of the south end, seen in the foreground in PLATE 3. It was in this space that the important find was made of three substantial copper or copper alloy objects: a long flat axe or chisel, a shaft-hole axe, and an axe-adze (FIG. 8; PLATE 7 *a* and *b*). The abandonment of this space may be presumed to be contemporary with that of the other parts of the Hall at the end of Phase C. The find at once suggests comparison with the 'Kythnos hoard' (Renfrew 1967, pls. 5–6) but both the integrity and the find-spot of that alleged assemblage have persuasively been called into question (Fitton 1989). What we may now term the Dhaskalio hoard, with its excellent context, represents an important example of Cycladic metalwork at the end of the EBA. One interesting and perhaps relevant find among the débris of the collapse in Trench VI, at the northern end of the Hall (and so approximately contemporary), was the lead cylinder or weight illustrated in our earlier report (Renfrew *et al.* 2007*c*, fig. 15. 12).

The complete excavation of Trench VI gives the best insight into the constructional sequence of this building. As noted above, it was preceded by a substantial building in Phase A, whose wall is clearly seen in the Trench VI sequence. The plan of that earlier building cannot at present be established. The floor levels associated with the building of Phase C are overlain by a considerable depth of debris, giving rise to the possibility that the finds recovered in the upper levels may have been in use on the hypothetical flat roof of the building. The construction of the Hall may be situated in Phase B or C, and its use continued to the conclusion of Phase C. The very considerable débris of the building, seen for instance in Trench XVIII (PLATE 5 *b*), indicates that this was a very substantial structure. Running along the ridge at the very summit of Dhaskalio it must have been a prominent landmark in all directions, clearly visible from Naxos and Ios as well as from all the Mikres Kyklades (Herakleia, Schinousa, and the Kouphonisia).

The Summit Enclosure

A curious feature of the summit area, immediately to the south of the Hall, is a small, enclosed space, roughly circular, some 2.4 m across, and accessible by a doorway to the south (FIG. 5; PLATE 4 *a*). Its structure incorporates three of the four limestone outcrops at the summit. It was in this space that a considerable quantity (more than 340) of rounded limestone pebbles was found. These smooth, rounded pebbles are clearly beach pebbles, and such stones had already been recovered and recorded as special finds on other parts of the site. Although beach pebbles are present on the shore at Dhaskalio Kavos on Keros, they are of poor quality marble. The limestone pebbles found in cultural contexts on Dhaskalio have instead been identified by John Dixon as coming from one of the beaches on Ano Kouphonisi. Those found in the summit enclosure had clearly been specially selected and deliberately brought to Dhaskalio. Metrical study by Gry Nymo suggests that these egg-shaped limestone pebbles in the summit enclosure were deliberately selected for their larger size and more rounded

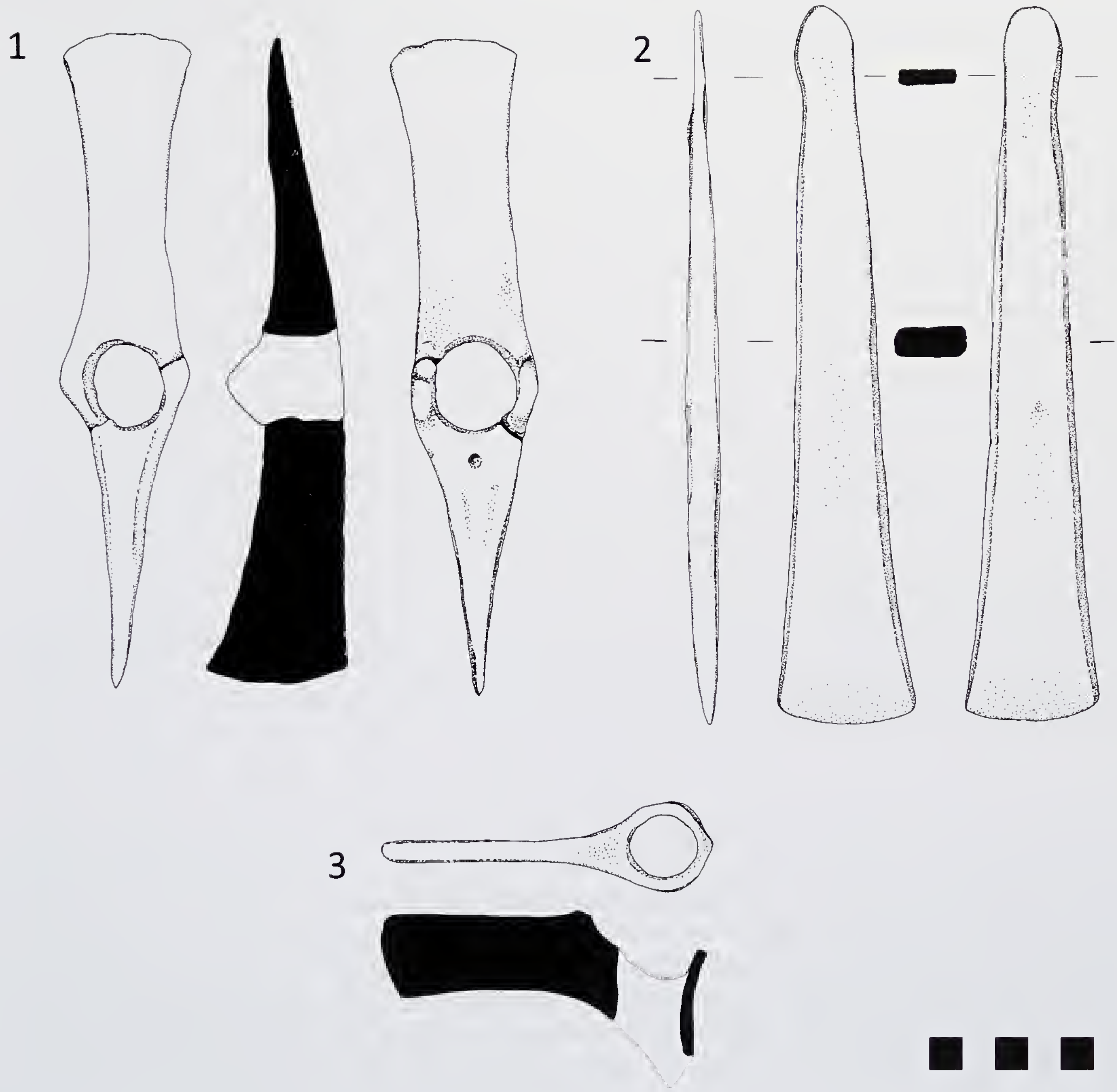

FIG. 8. The Dhaskalio hoard (Scale 1 : 3).

appearance than the average pebbles on the beach at Ano Kouphonisi. They are systematically larger than those studied for comparison from the Special Deposit South on Kavos, where such pebbles are also found.

This deliberate and perhaps successive deposition of selected beach pebbles in this special place is suggestive of ritual practice. The deposition of naturalia in an analogous manner is recorded from peak sanctuaries in Crete (Kyriakidis 2005, 144; Peatfield 1992; Nowicki 2007), and is of course well established as a ritual practice in classical times (Kron 1992, 631–3). No other artefacts of symbolic significance were found in the summit enclosure, other

than two of the attractive stone cylindrical spools or 'pestles' (perhaps weights) of which several have been found in varying contexts on Dhaskalio.

The South Summit Area

South of the summit enclosure (PLATE 4 *a*), whose entrance is also seen in the foreground of PLATE 5 *a*) the surface slopes down towards the small Byzantine or early mediaeval church, whose walls, lying over the EBA structures, may be seen in the background of PLATE 5 *a*. Trench VII lies further to the south.

The building excavated in Trench VII and that lying immediately to the west are separated by a narrow space or street some 1.0 m wide. Its surface is constituted by the bedrock, which is irregular. A comparable street probably runs up the hill from Trench XV, immediately to the south of Trench I. The building in Trench VII is beautifully constructed of laminar stone walling (see FIG. 6) and furnishes many architectural details, which will be discussed in the final report by Olga Philaniotou in her description of the excavated buildings.

The street in question runs north (PLATE 4 *b*), overlain now by the south and north walls of the church, and emerges into the space constituted by Trenches XXV and XX. To the east lies the room within Trench XXI, which originally intercommunicated with the building of Trench VII to the south.

Immediately to the north of these lies the summit of the site, defined by four prominent outcrops of metamorphosed limestone bedrock incorporated in the two structures of the summit, which we have designated the Hall and the Summit Enclosure.

Conservation

At the conclusion of the excavation the trenches at Dhaskalio Kavos were backfilled, with small superficial channels made to divert downwashed surface water on the slope away from the excavated areas. During the dig the excavations were visited by Eleni-Eva Toubaki of the Department of Restoration of Ancient Monuments of the Ministry of Culture, accompanied by Maria Wassenhoven, and designs were outlined by her for the wooden shoring for the deeper trenches at Dhaskalio. We would like to thank the Director of Restoration of Ancient Monuments, Dr Demosthenis Ziro, for his help with this matter. At the end of the dig the shoring was prepared by the excavation carpenter, Phanis Lesi, and the trenches backfilled.

The Finds

The finds from Dhaskalio are abundant, with pottery naturally the most plentiful cultural material. The frequent coarse wares (about 88%), include abundant storage jars, bowls and baking pans. The overwhelming majority of pottery (about 75%, following Peggy Sotirakopoulou's count) is of domestic character. This is in sharp contrast to that from the two Special Deposits at Kavos, which have much less domestic ware. Mat, cloth, and leaf impressions (to be studied by Jane Renfrew) appear on the bases of coarse closed vessels and offer a useful insight into the matting and textiles of the time.

The recovery of plant remains by flotation has allowed a preliminary assessment of the botanical food remains by Evi Margaritis. Although the study is now at a preliminary stage,

relatively large concentrations of emmer wheat and barley have already been identified in floor layers in Trenches VII and XVII. Other samples produced limited quantities of grape pips, olive stones, almond fragments, legumes such as bitter vetch, and other nut fragments. The presence of olive and vine is interesting, as they represent the first well-stratified finds of these species from the Cycladic EBA, and support the view that Mediterranean polyculture had developed in the area by this time.

The obsidian industry from Dhaskalio is under study by Tristan Carter and Marina Milić. Their preliminary observations suggest that the Dhaskalio finds may offer some insight as to how the craft of obsidian working was organized spatially and, perhaps more important, socially. Two locations, in Trench V and Trench XXIII, seem to attest the entire production sequence, with evidence for the procurement and working of true raw material, with a number of large cortical flakes, via finer decorticated blanks, to the items associated with the initial stages of blade production (crested pieces), and the end-products themselves, a complete blade-core and blanks associated with the core's rejuvenation. Other contexts on the site seem to have received their obsidian in the form of prepared cores.

The most important evidence for such working comes from the major structure (the Hall) on the site's summit. As Carter and Milić (pers. comm.) report:

> The building runs through four trenches, with obsidian recovered in varying amounts in all four. It is within Trench VI that we have clear evidence for production, with levels 27–42 producing a not inconsiderable quantity of obsidian, with a wide range of blanks including two blade cores (one complete), and a range of knapping debris, albeit mainly in the form of non-cortical blanks indicating that the person making these blades had either received a preformed nucleus from someone else, or had undertaken the initial roughing out of the cobble elsewhere. In the middle section of the building we have almost exclusively the end-products themselves (with some use-wear), while the southern end of the structure (Trench XXX) has also produced a certain amount of evidence for blade making. It is quite conceivable—estimates will be produced after the study season—that this represents a level of production above and beyond what was required by those working/living in this structure.

The other stone tools are the subject of study by Yorke Rowan and John Dixon. There are surprisingly few stone tools of well-established types. Most of the stone artefacts collected in the trenches and inventoried as 'special finds' are pieces of imported stone (such as emery from Naxos) indicating very little modification for use, but often with indications of wear. This may therefore be described as an 'expedient' technology. Quernstones are found but they do not seem as abundant as might have been expected on so large a settlement. Further study, aided by the petrological identifications of John Dixon, will perhaps clarify this slightly paradoxical situation.

A notable feature at Dhaskalio is the abundance in almost every context of 'stone discs', known elsewhere in the Cyclades from Ayia Irini (Wilson 1999, 148–9), Markiani (Angelopoulou 2006), Mount Kynthos (Plessart 1928, 33–4), Phylakopi (Renfrew *et al.* 2007*a*, 430, 434) and Korfari ton Amygdalion (Angelopoulou 2008). These are flat and circular, varying in diameter from less than 10 to more than 45 cm. In general they are made of stone with laminar fracture (marble and schist) so that the two faces are naturally parallel. The circular form is achieved by flaking. Only in a few cases is the discoid form produced by grinding. While some of the larger ones may have served as lids for pots, such as pithoi, and many could also have formed the base on which to stand a pot, their great abundance seems to us puzzling and enigmatic. They are to be the subject of special study by Michael Boyd.

Another puzzling feature of the finds is the almost complete lack of weaving equipment. Just two or three fragments of terracotta spindle whorls were found, in contrast to the 171 from EBA Markiani on Amorgos, where spinning and weaving seem well-attested (Gavalas 2006, 199–209). These disparities will require further careful study, with a consideration of the information on sheep to be gleaned from the faunal remains. At first sight they might call into question the status of Dhaskalio as a residential site—a difficult conclusion in view of the ceramic evidence. Alternatively, they might suggest an unexpected degree of specialization between Early Cycladic sites, with Markiani as a producer of wool and of textiles, and Dhaskalio as a consumer.

The site has yielded some metal objects, and modest indications of metallurgical production, now in the course of study by Myrto Georgakopoulou. In Trenches I and VII there are some indications of metal production, probably casting rather than smelting. The abundance of slags at Kavos Promontory, already the subject of preliminary study by Georgakopoulou (2007), suggests that this may have been the location where smelting took place. Splashes of copper on stone and the find of what may prove to be three tuyères in Trench I suggest some continuing metallurgical activity there (PLATE 7 *c*: compare a find from Ayios Dhimitrios in the southwestern Peloponnese: Zachos 2008, fig. 52 and pl. 54). A small shaft-hole hammer of lead from Trench VII may have been used in metalworking. Lead clamps to repair pottery were also found. Such use is an indication that lead was sufficiently cheap (and pottery sufficiently valued) to make such repair appropriate. The practice may further indicate some degree of metalworking at a domestic level. The find in 2007 in Trench VI, in the Hall on the summit, of a lead weight (of spool shaped form) as noted above (Renfrew *et al.* 2007*c*, fig. 15. 12) may be an indication of commercial production. The finding in different locations at Dhaskalio of up to twenty stone or Spondylus shell 'spools' (formerly termed 'pestles') should perhaps not be taken too quickly as confirmation of Rahmstorf's view (2003) that these are all to be regarded as weights. They are more frequent than most other categories of artefact (other than the ubiquitous stone discs). Their frequent presence (usually broken) at Dhaskalio Kavos may lead toward some different interpretation.

The marble bowl fragments at Dhaskalio are fairly numerous, some eighteen examples, invariably fragmentary. At EBA Markiani on Amorgos only a single such fragment was found in a stratified context, whereas that site yielded seven of the spools or pestles (Scarre 2006, 177). The comparison of the frequencies may reflect the greater wealth and centrality of Dhaskalio in contrast with Markiani. One piece from a large open bowl of marble, probably more than 50 cm in diameter and of preserved length 22 cm, was of note (SF 10713 from Trench VII, layer 11). Well polished on the inside, it was rough on the base and lower surface, giving the impression that it had been made to sit flat on the ground and so not to require polishing on the under surface. This fragment documents the largest marble bowl ever found in an Early Cycladic settlement (although larger pieces come from the Special Deposits at Dhaskalio Kavos). It hints at practices, and perhaps rituals, of which we know little.

The figurines from Dhaskalio are of particular interest. Ten have been recorded, all schematic in form and falling within the broad ambit of the Apeiranthos variety. It is remarkable, therefore, that not a single fragment of a canonical folded-arm figurine has come from Dhaskalio, in view of the many hundreds of such finds in the two Special Deposits at Dhaskalio Kavos, just opposite. This must carry significant implications for the different ways the two sites were used. It is also notable that most of the figurines are related in form (FIG. 7;

PLATE 8). The typical Dhaskalio figurine is schematic and with a triangular or squarish section, rather than the flat section of many of the Apeiranthos variety figurines at Dhaskalio Kavos, many of which are closer to the *Brettidolen* of the Grotta–Pelos culture. The head is typically triangular (suggesting the nose at the apex) rather than flat. It is thus now possible to identify a Dhaskalio sub-variety of schematic figurine. The find contexts are of Phase C. It is clear that this sub-variety is relatively late, and that it was produced and used after the later (Kastri phase) part of the Keros–Syros culture. The absence of folded-arm figurines on Dhaskalio remains to be explained.

At the conclusion of the excavation, the special finds of marble and other pieces were selected, as in 2006 and 2007, for transportation to the Naxos Museum, under the supervision of the conservator for the Ephorate, Giannis Staikopoulos. The bulk of the finds—the pottery, stone tools, obsidian and other special finds—were stored in the apotheke of the Ephorate, located in the basement of the Demotiko Scholeio of Kouphonisi.

Further Research

It is hoped that further information will come from the studies now in progress. The study of the micromorphology of floors and other deposits from the settlement should prove particularly rewarding. Charles French of the McDonald Institute for Archaeological Research in Cambridge, accompanied by Sean Taylor, has taken a very promising series of samples. Trench VII has yielded at least three major floor levels, the lowest of which is a compound floor level composed of several finely laminated alternating layers of white and pinkish brown calcitic 'plaster'. There are comparable samples from a number of other trenches. He was also able to observe and take samples from the continuing excavation at the Special Deposit South on Dhaskalio Kavos, broadly confirming his observations of 2007. It would certainly be helpful to broaden our knowledge of the range of activities undertaken within these various rooms, and the results will supplement the evidence already available from the stratigraphy and from the objects found. Soil samples were also taken by Lefteris Zorzos of University College London for the purpose of phytolith analysis. There is hope that this will supplement what is already emerging from the study of the seed remains recovered through flotation. It is anticipated that the animal and shell remains recovered from the water sieving and from the flotation sample will also be informative.

Characterization studies will prove particularly important for studying the sources of the pottery, obsidian, marble and other stones, and for comparing the source profiles for Dhaskalio and Kavos. Yannis Maniatis and Dimitris Tambakopoulos have continued their detailed study of the marble artefacts recovered, and it is hoped that a programme of sampling will serve to confirm the preliminary and provisional results already suggested—namely that most of the marble for these artefacts come from sources in south-east Naxos.

Jill Hilditch spent some time prospecting for potential clay sources for pottery making in Keros and Schinousa, and there is the hope that, with the aid of earlier studies, a clearer picture may soon emerge for the Cycladic Islands. For the pottery, macroscopic fabric study has already suggested significant trends in the changing frequencies of various imported fabrics. She reports (pers. comm.):

In terms of raw material sources, Amorgos, Naxos and Ios continue to offer the greatest potential for most fabrics seen within the ceramic assemblage at Dhaskalio (Marble, Quartz, Sandy, Blueschist, Redschist, Micaceous Quartz and Micaceous Other). Other islands have been identified macroscopically as possible sources for less abundant fabrics such as Siphnos (Talc), Thera (Pale Volcanic) and Melos (Red-Brown Volcanic). Only the petrographic analysis however will be able to offer a more detailed consideration of provenance and technological variation for each of these categories.

Analysis may also clarify the sources of the copper and lead used in the metallurgical practices at Dhaskalio. And while most of the obsidian found undoubtedly comes from Melos, Tristan Carter and Marina Milić have noted a few pieces that, on the grounds of appearance, might have come from Giali (near Nisyros) and the Central Anatolian sources respectively.

Broader environmental issues are also under consideration. In particular it would be helpful to establish the level and form of the prehistoric coastline near Dhaskalio. There are suggestions that, during the EBA, Dhaskalio might have been united with Kavos by a spit of land, forming a peninsula. This is one of the several aspects of the site and its finds, which are under study by our consultant geologist, John Dixon, but it may prove one of the most intractable.

Prospect

The excavations at Dhaskalio have revealed a major settlement of the Early Cycladic period. Its inception seems to have been contemporary with that of the Special Deposit South, situated opposite at Kavos on Keros some 200 m to the east. Study of the Kavos finds indicates that the heyday of the Special Deposit was clearly early in the time span of the Keros–Syros culture, i.e. during Phase A of Dhaskalio. Dhaskalio, as we have seen, continued to flourish during Phase B, by which time the use of the Special Deposit South seems to have diminished in intensity. By the time of Dhaskalio Phase C the Special Deposit seems to have gone out of use.

The interactions and interrelationship of the two sites will be the subject of special study during the compilation of our final report. But some distinctions are now clear. One of the most characteristic finds in the Special Deposit South is the well-known marble folded-arm figurine, always—without exception—found there in fragmentary condition after deliberate breakage. Not a single fragment of such a figurine has yet been recovered from Dhaskalio. There are also significant differences in the ceramic assemblages under study by Peggy Sotirakopoulou. For instance, the multiple lamps (also known from cemeteries on Kouphonisi), which are a prominent feature on Kavos, are not seen on Dhaskalio. Nor are the krateriskoi with stamped and incised decoration, known mainly from the cemetery at Chalandriani on Syros (see Renfrew *et al.* 2007*c*, fig. 7. 6–10). These open the possibility that the rituals of deposition practised at Kavos may have involved persons coming directly from other islands, such as Syros. The rich finds from Kavos and the abundant remains from Dhaskalio should offer many possibilities for further analysis, some of which we hope to incorporate in the final report now in preparation.

Dhaskalio was clearly a major settlement in its own right—no mere adjunct to the ritual activities on Kavos. Indeed, the building remains identified are significantly larger in area that those of Skarkos on Ios, hitherto one of the largest Early Cycladic settlements known, although there are larger settlements elsewhere in the Aegean, and these in turn are small

compared with many in the Near East. The continued prosperity of Dhaskalio into the later Phases B and C is clearly of great importance. This observation perhaps counters the view that this was a time of dramatic change in the Cyclades and suggests rather a period of considerable prosperity. It should also be noted that although Phase B at Dhaskalio was indeed contemporary with the occupation of Kastri on Syros, the term 'Kastri phase' has deliberately been avoided here, since the rather limited occurrence of forms characteristic of the Kastri Group, while of real chronological interest, does not seem of great significance otherwise. And Dhaskalio continued in occupation, with every indication of continuity into Phase C, almost to the inception of the Middle Cycladic period.

The fieldwork phase of our project is now concluded and the post-excavation study phase has begun. It is anticipated that much more will be learnt from the specialist studies already in progress. The excavation of the Special Deposit South on Kavos may now be regarded as completed. A fuller assessment of the material recovered remains to be undertaken. But it is clear that, taking into account also the Special Deposit North, Dhaskalio Kavos may be regarded as a major symbolic centre for the Cyclades and indeed one which had wider influence during the EBA.

In the case of the small island of Dhaskalio, however, we have only begun the investigation of what must be regarded as one of the major settlements of the EBA Aegean. We hope to resume work at Dhaskalio when the final report of our 2006 to 2008 field seasons has been completed. We have been fortunate in our work on the summit area to find good evidence for the later use of the settlement. But much remains to be learnt about the earlier phase, Phase A, contemporary with the main use of the ritual centre at Dhaskalio Kavos. There is more yet to learn about the relationship between the two sites.

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TABLE 1 Stratigraphic context of illustrated finds.

FIG. 7.1	SF 11795	TXX L13	Figurine of Dhaskalio sub-variety
FIG. 7.2	SF 11430	TXIV L6	Head of Dhaskalio figurine
FIG. 7.3	SF 5751	TVI L13	Figurine of Dhaskalio sub-variety
FIG. 7.4	SF 5746	TVI L12	Figurine of Dhaskalio sub-variety
FIG. 7.5	SF 5814	TVII L6	Figurine of Dhaskalio sub-variety
FIG. 7.6	SF 10793	TVII L39	Figurine of Dhaskalio sub-variety
FIG. 8.1	SF 12734	TXXX L7	Axe-adze of copper or bronze
FIG. 8.2	SF 12740	TXXX L8	Chisel of copper or bronze
FIG. 8.3	SF 12741	TXXX L8	Shaft-hole axe of copper or bronze
PLATE 6 (*a*) 1	Pot 8	TXIV L4	One-handled tankard
PLATE 6 (*a*) 2	C2145	TXXI L5	Rim fragment depas amphikypellon
PLATE 6 (*a*) 3	C 2109	TVII L32	*Urfirnis* depas handle
PLATE 6 (*a*) 4	C 2149	TVII L37+39	Pyxis rim
PLATE 6 (*b*), left	Pot 22	TVII L37	Fragments of whitish slipped jar (dec. vertical ribs)
PLATE 6 (*b*), right	C 2135	TVI L28	Red slipped pithoid jar (dec. successive ribs)
PLATE 6 (*b*), lower centre	C 2144	TXXI L5	Sherds (dec. dark-on-light cross-hatched)
PLATE 7 (*a*)	SF 12734	TXXX L7	Axe-adze of copper or bronze
PLATE 7 (*b*)	SF 12740	TXXX L8	Chisel of copper or bronze
PLATE 7 (*c*). 1	SF 10157	TI L26	Tuyère
PLATE 7 (*c*). 2	SF 10161	T1 L26	Tuyère
PLATE 7 (*c*). 3	SF 10130	T1 L25	Tuyère
PLATE 8. 1	SF 5746	TVI L12	Figurine of Dhaskalio sub-variety
PLATE 8. 2	SF 10769	TVII L32	Figurine of Dhaskalio sub-variety
PLATE 8. 3	SF 11430	TXIV L6	Head of Dhaskalio figurine
PLATE 8. 4	SF 10793	TVII L39	Figurine of Dhaskalio sub-variety
PLATE 8. 5	SF 5814	TVII L6	Figurine of Dhaskalio sub-variety
PLATE 8. 6	SF 5751	TVI L13	Figurine of Dhaskalio sub-variety

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A REASSESSMENT OF MACKENZIE'S SECOND AND THIRD CITIES AT PHYLAKOPI

Introduction

Phylakopi was first excavated by the British School at Athens from 1896 to 1899 under the successive directorships of Cecil Smith and David Hogarth, and the direct supervision of Duncan Mackenzie. The results of these excavations were published in 1904 as *Excavations at Phylakopi in Melos* (Atkinson *et al.* 1904) (fig. 1). The final chapter of *Excavations at Phylakopi* was a synthetic piece written by Mackenzie, in which he provided a description of the site's stratigraphy and suggested some cultural and historical contexts for its interpretation. Mackenzie saw the settlement at Phylakopi as comprising three successive 'Cities', preceded by evidence of 'pre-City' occupation. Each 'City' constituted a discrete architectural period, terminated by a site-wide destruction leading to its abandonment, followed by wholesale rebuilding, except in the case of the final 'City', when the abandonment was permanent. Mackenzie termed these cities 'First City', 'Second City' and 'Third City', and they are now considered broadly equivalent to Early Cycladic III, Middle Cycladic, and Late Cycladic periods of occupation (Barber 1987, 23 fig. 24; Warren and Hankey 1989, 41 table 2. 3, 55 table 2. 5, 71 table 2. 6), though the exact dating is open to refinement.

Mackenzie sub-divided each City into three chronologically distinct phases of occupation, each phase defined largely by changes in pottery types or styles: for example, middle phase contexts of the Second City were distinguished from earlier and later contexts by the predominance of painted curvilinear designs on locally produced pottery and the presence of Kamares ware imported from Minoan Crete. It is now conventional to refer to these City phases by a system of roman numeration, so that the middle phase of the Second City is City II-ii, the first phase of the Third City is City III-i, and so on. Mackenzie does not seem to have envisaged that the internal phases of a City would be separable architecturally, except for City III-iii.[1] Though he used ceramics to define City III-iii, suggesting that pottery of Cycladic tradition had by then been replaced by imported Mycenaean wares, he also noted that in some areas of the site City III-iii existed as a distinct architectural layer, overlying earlier City III-i buildings (Mackenzie 1904, 267, 270). City III-iii architecture did not extend over all the site, however, as in some places the uppermost buildings discovered were City III-ii in date, a fact that might have prevented him from claiming City III-iii as a fourth city.

The three city interpretation of Phylakopi's stratigraphy that Mackenzie proposed in 1904 has been challenged in its details,[2] but it was not until Colin Renfrew started excavating the site in the 1970s that its empirical substance was opened to close scrutiny. Renfrew came to criticize Mackenzie's interpretation on three counts (Renfrew 2007, 10–11 table 2. 2) (table 1). First, he found no evidence of Early Cycladic II occupation within the main City sequence, as claimed by Mackenzie for City I-i. He thought instead that it was pre-City, and called it

[1] With the other possible exception of the City II-iii Pillar Rooms. See discussion below.

[2] Barber, for example, has questioned the reality of City II-i (Barber 1978; 1987, 143–5; 2007, 233; though see also Barber 2007, 235).

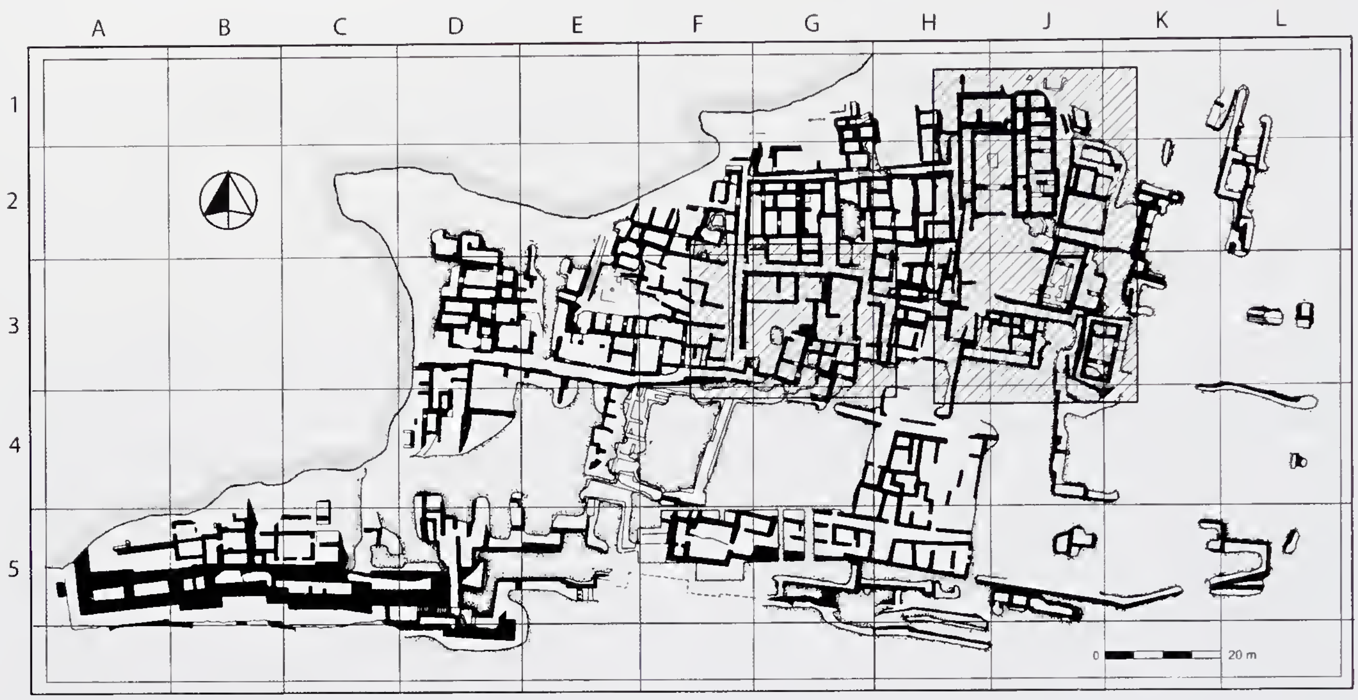

FIG. 1. Plan of Late Bronze Age Phylakopi (after Renfrew and Wagstaff, fig. 4. 2). Hatched areas are shown at a larger scale in FIG. 2 (HJK1–3, the Megaron area) and FIG. 3 (FG3, the Pillar Rooms area).

TABLE 1. Phylakopi periodization according to Mackenzie (1904) and to Renfrew (2007*b*).

Mackenzie's City	Renfrew's Period	Approximate date
III-iii	IV	LC III
III-i-ii	III	LC I-II
II	II	MC
I-ii-iii	I	EC III
I-i	0 (A2)	EC II
Pre-City	0 (A1)	EC I

Period 0.[3] Second, he suggested the architectural stratum that Mackenzie had recognized as City III-iii might be more substantial than Mackenzie had realized and therefore would better constitute a separate city (Renfrew's Period IV, with Mackenzie's City III-i-ii becoming Period III). Finally, and of most interest here, he also suggested that Mackenzie had been inconsistent in his attribution of Late Cycladic I–II architectural remains to Cities, sometimes regarding them as City III, but other times as City II. The result was, Renfrew suggested, that 'the term Second City became an ambiguous one, to be interpreted as Middle Cycladic when counting from the bottom, but sometimes meaning LB I when counting from the top' (Renfrew 2007, 10). Renfrew argued that this confusion had caused Mackenzie to misdate

[3] Renfrew used the term 'Period' to distinguish his architectural layers from Mackenzie's 'Cities'.

two key components of the site—the Pillar Rooms and the Fortification Wall—to the Middle Cycladic City II, which, in light of his own excavation results, Renfrew redated to the Late Cycladic I–II City III-i-ii (or, in his own terminology, Period III).

Against Renfrew's revisionism, Todd Whitelaw has offered a robust defence of Mackenzie, arguing that his ability as an excavator, close supervision of the excavation, and first-hand knowledge of the pottery would have prevented him from making erroneous attributions of the kind claimed by Renfrew (Whitelaw 2005, 44–5). Whitelaw has also drawn attention to the broader consequences of Renfrew's critique. Redating the City II-iii Pillar Rooms to Late Cycladic I–II effectively redates the end of City II from the Middle Cycladic–Late Cycladic transition to Late Cycladic II, and as the Pillar Rooms are central to any consideration of Minoanization at Phylakopi and thus of the Cyclades more generally, redating them has historical implications that extend throughout the Aegean (ibid. 44, 58–61). He would prefer to retain a transitional Middle Cycladic–Late Cycladic date for the destruction of the Pillar Rooms and thus for the Second City more generally.

This paper offers another critical examination of the later parts of Mackenzie's urban periodization. It proceeds in four stages. First, it describes Mackenzie's engagement with Phylakopi's stratigraphy and the terminologies he developed to describe it. Second, it considers discrepancies between what Mackenzie described during the excavation as stratigraphical locations of contexts and what he later reported in his 1904 synthesis. Third, it reassesses the date of the Pillar Rooms. Finally, it reviews the evidence for a site-wide Second City destruction. In general, the paper's evidence and arguments support Renfrew's contention that Mackenzie's allocations of Late Cycladic I–II architectural remains to Cities were inconsistent, but suggest that the consequences are more problematical than Renfrew supposed. It concludes that a transitional Middle Cycladic–Late Cycladic date for the end of the Second City is unlikely, and that a Late Cycladic II date is more probable.

Excavation

Mackenzie set out to investigate the history of Phylakopi by exposing walls and investigating their structural and stratigraphical relations, while simultaneously collecting pottery and sorting and identifying it according to the depth at which it was found (Mackenzie 1963, 10, 30, 88). The architectural stratigraphy could then be combined with the pottery sequence to construct a site chronology. He recorded the excavation results daily in a series of four annual daybooks, which contain a lot of information about the relative positions of walls and floors, although rather less information about pottery (Mackenzie 1963).[4] In these daybooks, he made use of various terminologies to describe the site's stratigraphy, which he changed as the excavation progressed. He never used the term 'Cities' in his daybooks, he introduced it in his contribution to *Excavations at Phylakopi*, where it succeeded his earlier use of 'settlements' in the 1898 preliminary report.

[4] Mackenzie's daybooks of the excavations are in the archive of the British School at Athens and were made more widely available by Colin Renfrew in 1963 when he prepared a typescript of them (Mackenzie 1963). Copies of this typescript volume are on deposit at the libraries of the British School at Athens, the Department of Classics at the University of Cambridge, the Ashmolean Museum at the University of Oxford, and the University of Cincinnati. Boyd *et al.* (forthcoming) discuss this and other components of the Phylakopi archive in some detail.

Horizontal control of the excavation was achieved by excavating individual rooms as trenches. A site grid was established at the beginning of the excavation, with each grid square measuring 20 m square. From west to east squares were lettered A–K, and from north to south numbered 1–5. Thus each square can be identified by a unique alphanumeric index, for example A1 or J2. Within each grid square, rooms were numbered sequentially, so that each excavated space (room) has a unique identifying number, comprising the grid square index followed by room number (for example A1:5 or J2:3). Unfortunately, room numbering was not consistently applied throughout the excavation, so that on the daybook plans it could change between seasons. Then, in 1904, Atkinson published two plans of the site; although he retained the established site grid and adopted a room numbering system, again his numbering was not consistent across plans. To avoid confusion when referring to individual room numbers, Renfrew has suggested that each number should be preceded by an abbreviated reference to the plan on which it appears (Renfrew 1963, iv). The abbreviations adopted here are: DB96, DB97, DB98, and DB99 respectively for each of the annual daybook plans; and Atkinson 1 for his First and Second Periods plan, and Atkinson 2 for his Third Period plan (Atkinson 1904, pls. 1–2).

The excavation commenced in 1896 at the west end of the site where the upper courses of the large Fortification Wall were visible above ground, and where there was a history of unauthorized digging by local people looking for saleable obsidian and other artefacts. By the end of the 1897 season, Mackenzie was able to sketch out in his daybook the tripartite ceramic sequence and associated architectural stratigraphy that was to structure all future interpretations of the site (TABLE 2) (Mackenzie 1963, 81–3). The uppermost pottery discovered was always what he termed Mycenaean, and was decorated with lustrous paint. Below this he found 'pre-Mycenaean' pottery, which was decorated in matt black paint on a pale yellow slip (ibid. 12, 19). Pre-Mycenaean pottery could be subdivided into earlier and later phases. Mackenzie compared the latter to 'Theraean' pottery,[5] and concluded that it must have been the product of a 'native Melian civilization' (ibid. 34–5); the earlier or pre-Theraean pottery was always hand-made, thicker in section, and painted with geometric designs (ibid. 40, 42).

The architectural stratigraphy centred upon the Fortification Wall, where Mackenzie identified two building phases. The first phase comprised the original stone wall, the second phase comprised an added bastion in grid square B5, together with heightening or repair of the pre-existing wall. He associated the first phase with his pre-Mycenaean (Theraean) pottery, and the second phase with Mycenaean pottery (Mackenzie 1963, 16 n. 4, 34, 36, 41, 81–2). He also found evidence for settlement predating the construction of the Fortification Wall, including a thick deposit of obsidian implements associated with pre-Theraean pottery in square B5, and walls and deposits containing pre-Theraean pottery underneath the Fortification Wall in squares AB5 (ibid. 22–3, 42–3, 45, 53).

The following 1898 season was a pivotal one for the excavation. Hogarth, who would subsequently write the final report, took over as director, and Edgar arrived to study the pottery. The eastern part of the site was opened to excavation after acquisition from the landowner (Hogarth 1898, 3), and the length of the season and the size of the work force were both

[5] LC I 'Theraean' pottery was known at the time from private collections on Thera and from the excavations of Fouqué, Mamet and Gorceix (Tzachili 2005).

TABLE 2. Phylakopi periodization as understood by Mackenzie at end of the 1897 season.

Ceramic phase		Architectural relation
Mycenaean		Additions to fortification wall
Pre-Mycenaean	Theraean	Fortification wall
	Pre-Theraean	Underneath fortification wall

increased, so that more effort was expended on the site in 1898 than over the previous two years combined.[6] Mackenzie drew attention to the 'huge disproportion between the rich finds of 1898 and the comparatively poor ones of 1896–7' (Mackenzie 1898, 18 n. 1), and the ideas set out in the 1898 preliminary report survived to structure the 1904 final report.

As the 1898 season progressed, Mackenzie increasingly came to describe the architectural succession in terms of strata,[7] numbered from the top down, which he associated with a terminology of settlements, numbered successively from the oldest settlement up (TABLE 3) (Mackenzie 1963, 169 n. 3). He routinely referred to the first, uppermost stratum as Mycenaean. He made it clear in his daybooks that he regarded the strata as coherent architectural units, not simply as absolute levels or spits, when he explained diagrammatically the difficulty of separating walls of different strata found at the same level (ibid. 126). In the 1898 preliminary report, Mackenzie went on to sketch out the rudiments of what he would develop more systematically into his three-City periodization (Mackenzie 1904). He described three building strata overlying a fourth stratum of 'early deposit', each stratum comprising the remains of a 'settlement'. The introduction of a new settlement period (the first settlement) was due to the discovery in J1–2 of Early Cycladic I artefacts (but no associated walls). The changing decorative repertoire of pottery found in second stratum (third settlement) contexts allowed it to be divided into three chronologically distinct phases, and the pottery found in first (Mycenaean) stratum (fourth settlement) contexts could be divided into two phases.

Edgar's contribution to the 1898 preliminary report outlined a four-stage pottery sequence, the later three stages corresponding to those known by 1897, though better characterized. But it was clear by 1898 that the pottery sequence did not run in exact step with the architectural stratigraphy, and that the pottery assemblages constituting individual stages of the main City sequence could not be separated from one another by absolute stylistic breaks (TABLE 3). Edgar's second (previously 'pre-Theraean') stage mainly comprised pottery painted with geometric designs (Edgar 1898, 41–3), which was introduced in the second settlement, but continued into the first phase of the third settlement (Mackenzie 1898, 28). His third (previously 'Theraean') stage pottery developed out of the second stage and was characterized by painted curvilinear designs and the appearance of naturalistic motifs, including plants and animals (Edgar 1898, 44). Mackenzie observed that 'some of the most mature types in Mr Edgar's third class (pp. 44–7) really occur in the deposit of the Mycenaean

[6] For the first three years of the excavation Mackenzie kept a record in his daybook of the number of men employed to work at the site. In 1896, the season lasted 10 days and expended 222 man-days of labour. In 1897, the season lasted 27 days and expended 1496 man-days. These figures jumped in 1898 to 34 days and 2463 man-days respectively. The 1899 season lasted 35 days, with probably a similar expenditure of manpower to the 1898 season.

[7] Mackenzie's first mention of a numbered stratum was just under half-way into the 1898 season on 3 May when he described the discovery of three Geometric cups in a '3rd stratum deposit' (Mackenzie 1963, 124).

TABLE 3. Phylakopi periodization as understood by Mackenzie at the end of the 1898 season.

<table>
<tr><th>Ceramic stage (Edgar)</th><th>Settlement</th><th>Stratum</th></tr>
<tr><td>4. Imported Mycenaean</td><td rowspan="2">IV</td><td rowspan="2">1</td></tr>
<tr><td rowspan="2">3. Painted (curvilinear, naturalistic)</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">2</td></tr>
<tr><td rowspan="2">2. Painted (geometric)</td></tr>
<tr><td rowspan="2">II</td><td rowspan="2">3</td></tr>
<tr><td rowspan="2">1. Primitive</td></tr>
<tr><td>I</td><td>4</td></tr>
</table>

city' (Mackenzie 1898, 33). Mackenzie associated Edgar's fourth stage pottery (Mycenaean) with the second phase of his fourth settlement.

Final Report: Excavations at Phylakopi in Melos (1904)

The 1899 daybook and preliminary report had little new to say about ceramic phasing or stratigraphy. Then, in 1904, *Excavations at Phylakopi in Melos* was published, including chapters by Hogarth on the excavation, Atkinson on the architecture (including site plans), Edgar on pottery, and the final synthetic chapter by Mackenzie. There was doubt as late as 1903 as to whether Mackenzie, who was a junior member of the British School, would be a contributor (Momigliano 1999, 31), but finally he did write his chapter. This was four years after Atkinson had prepared his site plans, and most likely after Atkinson and Edgar had written their chapters. By that time, a large body of comparative material had become available from sites in Crete. At Knossos, the recognition, description and chronological ordering of the different pottery styles were well underway, with a preliminary conspectus published by Mackenzie himself (Mackenzie 1903), and more material was forthcoming from excavations at Phaistos, Gournia, Zakro, and Palaikastro.

Atkinson described the site in terms of three Periods of settlement and prepared two plans, the first showing walls of the 'First and Second Periods', and the second walls of the 'Third Period' (Atkinson 1904, 25–69, pls. 1–2). Edgar's account of the pottery offered a more resolved version of his 1898 classification, dividing his 1898 'Painted (curvilinear, naturalistic)' pottery into early and late phases. The early phase comprised his groups 'Pottery of the Early Mycenaean Style with Designs in Matt Black' and 'Pottery of the Early Mycenaean Period with Designs in Black and Red', while his late phase group was 'Later Local Pottery of the Mycenaean Period'. Edgar matched his pottery sequence to Atkinson's three Periods, not to Mackenzie's Cities (Edgar 1904, 159–63), and it was left to Mackenzie to describe what he thought to be the typical pottery for each City.

On the face of it, from the architectural associations of the pottery sequence, Atkinson's Periods are equivalent to Mackenzie's Cities (TABLE 4). It might be further assumed, on the basis of the table that Mackenzie added to the daybooks at the end of the excavation in 1899 (Mackenzie 1963, 169 n. 3), that the three Periods/Cities were directly equivalent to the three upper excavated strata. Unfortunately, this is not the case. The apparently neat concordance between Periods and Cities breaks down when walls and buildings belonging to Mackenzie's City III-i are located on Atkinson's plans. Several contexts that in 1904 Mackenzie

TABLE 4. Phylakopi periodizations as understood by Mackenzie and by Atkinson in 1904.

<table>
<tr><th>Ceramic phase (Edgar)</th><th>Period (Atkinson)</th><th>City (Mackenzie)</th><th>1898 Settlement</th></tr>
<tr><td rowspan="2">4. Imported Mycenaean</td><td rowspan="3">3</td><td>III-iii</td><td rowspan="3">IV</td></tr>
<tr><td>III-ii</td></tr>
<tr><td>3. Local (late)</td><td>III-i</td></tr>
<tr><td>3. Local (early)</td><td rowspan="2">2</td><td rowspan="2">II</td><td rowspan="2">III</td></tr>
<tr><td rowspan="2">2. Painted Geometric</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">I</td><td rowspan="2">II</td></tr>
<tr><td>1. Early (advanced)</td></tr>
<tr><td>1. Early (primitive)</td><td></td><td>Pre-City</td><td>I</td></tr>
</table>

identified as City III-i were included by Atkinson on his plan of the Second Period, most obviously the walls underlying the Megaron and areas immediately to the south and east in J2–3 (Atkinson 1904, pl. 1; Mackenzie 1904, 267). Clearly, a context appearing simultaneously in Atkinson's Second Period and Mackenzie's Third City must have been discovered in either the first or the second stratum, but not both, and so in their 1904 reports either Atkinson or Mackenzie must have departed from the architectural stratigraphy that had been observed and recorded during the excavation.

The Stratigraphy and Chronology of the Early Third City

The poor agreement between the later parts of Atkinson's and Mackenzie's respective periodizations raises serious questions about the exact stratigraphical locations of City III-i contexts (i.e. about whether they were discovered in the first or the second stratum), and also about the date of the major break between the two strata. If Mackenzie's equation of strata with settlements shown in TABLE 3 is assumed to extend to his 1904 Cities, then the first stratum would be exclusively Late Cycladic Third City and the second stratum would be Middle Cycladic Second City, with the break between strata caused by the Second City destruction at the Middle-Late Cycladic transition. But this does not appear to be the case. Analysis of architectural contexts identified by Mackenzie in 1904 as exemplifying City III-i-ii shows that many if not most of them were found in what Mackenzie thought to be stratum two, not in the uppermost stratum one. Thus the excavated strata cannot be directly equated to Cities as TABLES 3 and 4 suggest, as at least some second stratum buildings must have been occupied into the Late Cycladic period.

Mackenzie reported in 1904 that City III-i buildings had been encountered immediately underneath the City III-iii Megaron complex and associated 'superficial constructions' immediately to the east of the Megaron in grid squares J2–3, and also underneath other 'superficial constructions' in grid squares DE4 and DEF2–3 (Mackenzie 1904, 267). When discussing these latter areas in his daybook at the beginning of the 1898 season, he remarked that:

> pavement marked the Mycenaean floor-level as only a few centimetres from the surface at most parts of D2–3 E2–3. Thus we are at once on the borderline between Mycenaean and pre-Mycenaean (Mackenzie 1963, 89).

He went on to contrast the better quality pre-Mycenaean walls found below the level of the pavement with the 'much rougher and more carelessly built Mycenaean walls above them' (ibid. 90). The 'carelessly built' Mycenaean walls encountered during the excavation are surely the 'superficial' City III-iii walls referred to in the 1904 report. Thus the lower pre-Mycenaean walls recorded in the daybook must have been those dated to City III-i in 1904. This area was excavated before Mackenzie had developed his terminology of strata, but given that what at the time he called pre-Mycenaean walls would later be termed second stratum, it is clear that the walls beneath the City III-iii 'superficial constructions', which in 1904 Mackenzie would interpret as City III-i, had been discovered in the second stratum.

Returning to the Megaron complex, Mackenzie's statement that the City III-iii Megaron had been built over City III-i buildings (Mackenzie 1904, 267) can be tested against Renfrew's findings in the same area (FIG. 2). Renfrew excavated two trenches adjacent to areas previously dug by Mackenzie: trench ΠD I/ΠE to the north and west of the antechamber (Atkinson 2 HJ2:18), and trench ΠC to the west of Mackenzie's deep sounding (Atkinson 2 J1:13; Renfrew 2007, 8, fig. 2. 2).

Mackenzie excavated the Megaron antechamber in 1899 as DB99 HJ2:3. The first stratum north (Megaron) wall went down 1.50 m beneath the surface, where it cut through earlier walls 'of 2' (Mackenzie 1963: 183–4). These walls 'of 2' were later numbered by Renfrew as his Megaron Walls 26 and 27 (Renfrew *et al.* 2007, 34 fig. 3. 15–16). Renfrew allocated them to his Late Cycladic I–II Period III and they were found to overlie Middle Cycladic Period II and Early Cycladic Period I walls. Thus in chronological terms Mackenzie stated correctly in 1904 that the Megaron was a later City III construction built over earlier City III buildings (Mackenzie 1904, 267), but in 1899 he had found those earlier City III buildings in stratum two, not in stratum one. Furthermore, he had not recognized that here at least stratum two comprised two distinct architectural layers, Renfrew's Periods II and III.

The situation in the eastern Megaron room (Atkinson 2 J1:13; excavated as DB98 J1:3) is different. In 1898 Mackenzie sunk his sounding down to bedrock through the eastern part of this room. About 1.2 m from the surface he discovered the top of a NNE–SSW-running wall, which bisected the room (Atkinson 1 J1–2:1, 8, 10). Mackenzie considered this wall to be second stratum and continued to dig down to the east of it (Mackenzie 1963, 105, 111). Renfrew excavated down to the west of the wall (Megaron Wall 44), and discovered its lower courses to be associated with a series of Middle Cycladic floors, which probably dated its construction (Renfrew *et al.* 2007, 45). Just over a metre above the Middle Cycladic floors, however, a series of Late Cycladic I–II floors also made use of the wall, indicating that the wall had been reused or had remained in use throughout the Middle Cycladic–Late Cycladic II period (Renfrew *et al.* 2007, 43–4 fig. 3. 23). Thus again a 1904 City III-i context had in 1898 been found in stratum two, and Renfrew discovered that here, at least, Mackenzie's stratum two comprised architectural remains dating from the Middle Cycladic through to the Late Cycladic II periods.

In 1904, Mackenzie also identified and described several individual City III-i contexts. One was a room (Atkinson 1 J3:2) 'belonging to a house of the ... early period of the Third City' excavated in 1899 (FIG. 2). Mackenzie recorded this house in his daybook as discovered beneath the Mycenaean stratum (DB99 J3:2; Mackenzie 1963, 196–9; see also 1904, 264), and described it as 'a pre-Mycenaean house', 'one of the best preserved constructions of 2 on the whole site' (ibid. 196). The room and the adjacent room (Atkinson 1 J3:7) contained a

FIG. 2. Plan of the Megaron area, showing Atkinson's Third Period architecture (solid black) and Second Period architecture (Rooms J3:2, 7) (after Atkinson 1904, pl. 2).

'vast hoard of pottery', which he said 'agreed with the character of the house as belonging to the 2nd stratum' (ibid. 196, 199).

The evidence from other contexts that in 1904 Mackenzie identified as City III-i is more ambiguous. Sometimes, his dating was prompted by the discovery of Late Cycladic I objects in contexts of uncertain stratigraphy (rooms Atkinson 2 F2:12 = DB98 F2:3; Atkinson 2 F4:1–6 = DB98 F4:3–5; and Atkinson 2 G1:7 = DB98 G1:2). Sometimes, frankly, he just seems

confused. For example, he states that City III-i pottery was 'contemporary with that of the end of the first palace period at Cnossos' (Mackenzie 1904, 267), and points to the discovery of bird jugs in the floor deposit of 'an important early house of the Third City in the south part of EF 3' (ibid. 264). He used those same criteria, however, for assigning the Pillar Rooms to City II-iii (ibid. 262; see also below).

In 1904, City III-ii was less well defined than the preceding City III-i, with fewer contexts cited and contextual attributions depending almost entirely upon the identification of dateable Minoan imports, such as steatite 'blossom bowls' (Bosanquet and Welch 1904, 197). An exemplary context was Atkinson 2 JK3:5–28 (= DB98 JK3:1–2; see also Mackenzie 1904, 266). At the time of excavation, Mackenzie was clear that this two-roomed house was 'Mycenaean': there was no superimposed architecture, its walls went down to a depth of between 1.80 to 2.0 m below the surface, and the pottery was entirely Mycenaean (Mackenzie 1963, 114). Parts of two steatite bowls were found above the Mycenaean floor level, and in the 1898 preliminary report Mackenzie stated that such steatite bowls were only found in 'the latest deposit of all' (Mackenzie 1898, 34). By 1904, however, he was aware that these bowls had been found in the 'second period of the palace at Cnossos' (Mackenzie 1904, 266), and he argued retrospectively that although City III-ii houses such as this one were in the highest architectural stratum, their floors were 'considerably deeper' than adjacent Mycenaean constructions. The nature of the finds also led him to speculate that they would have been abandoned before City III-iii had been built, perhaps as part of the 'catastrophe' that had heralded the building of the Megaron (ibid. 267).

Not all suggested City III-ii contexts were in the uppermost stratum one. Room Atkinson 2 H2:14 (DB99 H2:8), recognized as City III-ii because of the discovery there of an ivory ring (Bosanquet and Welch 1904, 193 fig. 162), was discovered in stratum two, beneath stratum one walls and a floor (Mackenzie 1963, 221, 224, 226–7).

The conclusion to be drawn from the sum of these observations is clear. As far as can now be ascertained, across a large part of the site, about 60%,[8] contexts that in 1904 Mackenzie would regard as City III-i had, perhaps without exception, been discovered in stratum two (TABLE 5). City III-ii succeeded City III-i, and although one of Mackenzie's two City III-ii contexts was found in stratum one, the other had been built over and was found in stratum two. If, as it now appears, most City III-i and some at least City III-ii contexts were found in stratum two, it follows that the stratum two of the daybooks is not conterminous with the City II of the 1904 report. Stratum two comprised architectural remains dating from Middle–Late Cycladic II.

Renfrew tried to clarify the later stratigraphy of areas dug by Mackenzie by introducing a new Late Cycladic I–II architectural Period (III) to replace Mackenzie's City III-i-ii, but this new Period does not really get to the root of the problem. Renfrew's own excavation results suggest a more complex reality. While in two of his trenches (ΠS in the Pillar Rooms area and ΠD I/ΠE in the Megaron complex), Renfrew did indeed uncover what appears to be a singular Late Cycladic I–II architectural stratum, as denoted by the co-occurrence of walls and floors, in his other Megaron trenches (ΠA, ΠC, and also ΠD I/ΠE) he found distinct Late Cycladic I–II floor layers utilizing pre-existing MC walls. In areas of reuse or continuing use

[8] Mackenzie noted City III-i remains beneath those of City III-iii in ten grid squares, which is approximately 60 percent of the area excavated in 1898–9.

TABLE 5. Suggested relationship between architectural strata recorded in Mackenzie's daybooks and Cites as defined in 1904.

Daybook stratum (Mackenzie)	1904 City (Mackenzie)	Period (Renfrew)
Stratum 1	City III-iii	IV
Stratum 2	City III-i–ii City II	III II
Stratum 3	City I	I

such as those, Renfrew's introduction of a new Period does not seem warranted, and they are better accommodated by increasing the chronological span of the second stratum to include Late Cycladic I–II, as suggested above.

If Late Cycladic I–II use or reuse of Middle Cycladic walls was widespread across the area of the site excavated by Mackenzie, it would go a long way towards explaining his apparent confusion. In those areas, Late Cycladic I–II floors defined by pottery would indeed have been found in second stratum contexts, with the pottery causing them to be allocated to City III-i–ii, in apparent defiance of their stratigraphic position. In other areas, though, Late Cycladic I–II floors would have been encountered within their own architectural stratum (corresponding to Renfrew's Period III) and therefore separated from stratum two by a stratigraphic break. It is not obvious that Mackenzie noticed this break during excavation of the Megaron antechamber, but Atkinson did. The Late Cycladic I–II walls are marked on his Second Period plan as 'Additions of Second Period' (Atkinson 1 HJ2:9, 15). If Atkinson is any guide, however, there cannot have been much autonomous Late Cycladic I–II walling, as there are only a few such 'Additions' marked on his plan.

The Date of the Pillar Rooms

Mackenzie distinguished between City II-iii and City III-i because of the perceived architectural break between City II and City III, and although he clearly recognized the existence of a distinct City II-iii ceramic phase (Mackenzie 1904, 262 pls. 16–21), he failed to describe any City II-iii context, with the exception of the Pillar Rooms. Thus the date of abandonment of the Pillar Rooms by default dates the end of City II-iii, and the reason for their abandonment might reflect the nature of the end of the Second City as a whole. The importance of the Pillar Rooms is further magnified by the Minoan resonance of their architectural form and frescoed decoration, so that their date and the manner of their destruction have a direct bearing on broader debates about the character and historical substance of Minoanization. Mackenzie argued in 1904 that the Phylakopi Pillar Rooms must have been broadly contemporary with Minoan examples found on Crete (Mackenzie 1963, 261), and since Evans assigned a Middle Cycladic III date to them in 1921, it has become conventional to regard the end of City II as coinciding with the Middle–Late Cycladic transition. Unfortunately, a critical reading of Mackenzie's 1904 argument for dating the Pillar Rooms shows it to be ambiguous, leaning heavily on finds from Knossos rather than on evidence from Phylakopi itself, and the Middle Cycladic III date attributed to them is almost certainly wrong.

FIG. 3. Plan of the Pillar Rooms area, showing Atkinson's First and Second Period architecture, and the location of Renfrew's trench ΠS (after Atkinson 1904, pl. 1).

The Pillar Rooms were discovered at the end of the 1898 season, and excavation was completed early in 1899 (Hogarth 1904, 16–18; Atkinson 1904, 40–1 fig. 26; Mackenzie 1904, 261–3). There are two Pillar Rooms, each one at the north end of a north-south oriented building (FIG. 3: rooms 4 and 6). The two buildings were probably connected by a third intermediary building to form a single architectural complex with a north face overlooking an open courtyard (Atkinson 1904, 39 fig. 25; Whitelaw 2005, 53–60, fig. 4). Mackenzie appears to have paid particular attention to the excavation of this area, probably because of the remains of wall frescoes that were found there, and that had probably decorated the walls of upper-storey rooms (Bosanquet 1904; Morgan 2007).

It should be noted that the numeration of the Pillar Rooms in the available documentation is confusing because Mackenzie assigned different numbers to some of the rooms in his 1898 and 1899 seasons. In addition, Hogarth erroneously used an 1898 room number (Hogarth 1904, 17). The concordance is:

	G3 room number						
Mackenzie 1963 (DB 98)	9	8	4	7/5	1	2	3
Mackenzie 1963 (DB 99)	9	8	2	4	3	5	6
Atkinson/Mackenzie 1904 (pl. 1)	3	4	5	10	6	11	17
Hogarth 1904							3

The Pillar Rooms are one of the few areas where Mackenzie applied proper stratigraphic reasoning, based on the presence or absence of fresco fragments in excavated layers. The daybooks record three architectural strata (Mackenzie 1963, 169). The lowest stratum was founded on bedrock and survived to a height of about 1 m. Above this lowest or third stratum were second stratum walls, surviving to a height of about 2 m, with their tops about 0.6 m from

the surface. Above these second stratum walls were first (Mycenaean) stratum walls. Thus the area of the Pillar Rooms offers a good example of the tripartite architectural succession that Mackenzie claimed to be typical of the site as a whole. The second stratum remains were associated with floors, which, in two rooms, supported centrally-placed rectangular pillars. The deposits above these floors contained fragments of frescoes that had presumably fallen from walls associated with the floors and pillars in second stratum rooms.

In 1904 Mackenzie assigned the Pillar Rooms to City II-iii. To date them, and thus City II-iii, he observed that several pillar rooms had been discovered in Crete, that they all dated to 'the first great period of the palace', and that the 'cumulative evidence from Crete is sufficient warrant for assigning the Melian pillar-houses to the same general period' (Mackenzie 1963, 261). The excavation evidence, he suggested, fell in line. The frescoes were contemporary with examples found at Knossos, and he drew the reader's attention to pottery that was 'characteristic of the period to which the pillar-houses belong' (ibid. 262 pls. 16–21). This pottery encompasses Edgar's classes 'Early Mycenaean Style with Designs in Matt Black' and 'Early Mycenaean Period with Designs in Black and Red', which would now be regarded as later Middle Cycladic White (Barber 2007, 181, 183), and includes some Black and Red bird jugs.

It was obviously fresh in Mackenzie's mind, while writing his chapter, that in 1903 three Black and Red Melian bird jugs had been found sealed in the Temple Repositories at Knossos (Evans 1903, 49–51). He said that 'The bird-vases of Melos are a characteristic class for the period to which the pillar-houses at Phylakopi belong', and that 'the environment in which the imported Melian vases of this class were found at Cnossos makes it clear that the pillar-houses of Melos are contemporary with those of Crete and with the first foundation of the Palace of Cnossos' (Mackenzie 1904, 262). Evans, in the 1903 preliminary report for Knossos, had already suggested the synchronism (Evans 1903, 49–50), and in 1921 he was more specific, writing that 'The date of the final catastrophe of the Pillar Rooms at Phylakopi is ceramically equated with the "bird-vases"' (*PM* i. 547 n. 1). He dated the 'bird-vases', and thus the 'final catastrophe' of the Pillar Rooms and also the end of City II to late Middle Cycladic III (ibid. 560), and said that 'the date of the structures themselves and of their painted stucco decoration goes back to the earlier phase of Middle Minoan III' (ibid. 547 n. 1). Thus the dating of the Phylakopi Pillar Rooms to Middle Cycladic III seems to hinge upon the presence of Melian bird jugs in a context at Knossos dated to Middle Minoan III by Evans.

There are several problems, however, with dating the Pillar Rooms and thus City II-iii to Middle Cycladic III. First, and most importantly, other than architectural resemblance, Mackenzie did not actually propose any material evidence to support his claim that the Phylakopi Pillar Rooms were contemporary to those at Knossos. There is no record to show that any pottery of types he quotes as being exemplary of the City II-iii phase, including the bird jugs, was actually found in the Pillar Rooms. In fact, not much pottery was found there at all. Hogarth, who had been present on site in 1898 when the Pillar Rooms were discovered and excavated, observed that in rooms Atkinson 1 G3:6, 11, 17 pottery was 'very scarce and whole vases were not found' (Hogarth 1904, 17). Thus attempts to redate the Pillar Rooms by extending the chronological span of Mackenzie's exemplary pottery into Late Minoan I (e.g. Scholes 1956, 35; Warren and Hankey 1989, 66) are largely redundant. The pottery only dates the Pillar Rooms if it was actually found there. It is now known that bird jugs enjoyed a currency into Late Cycladic I (Davis and Cherry 2007, 266), but there is still no evidence to

suggest that any bird jugs were found in a good association with the Pillar Rooms, and thus the Knossian synchronism is specious.

Mackenzie did specify some finds in his daybooks, though they do little to clarify the situation. In the western Pillar Room (Atkinson 1 G3:4) several pedestalled bowls were recovered, decorated with 'meander spirals' in matt red on a yellow slip (room DB 98 G3:8; Mackenzie 1963, 162, 167). Edgar[9] discussed them in the context of his 'Later Local Pottery of the Mycenaean Period' (Edgar 1904, 137–8, pl. 27. 1), pottery that for Mackenzie was characteristic of his City III-i. Their decoration places them within the Late Minoan IA stylistic tradition (Driessen and Macdonald 1997, 252), though Whitelaw has argued that they 'need not be inconsistent with a date close to the boundary between the MBA and LBA' (Whitelaw 2005, 48). The exact stratigraphic locations of their findspots are not known. The first examples discovered in 1898 were 1.0 m from the surface, or 0.3 m above the floor upon which the pillar rested—high in stratum two (Mackenzie 1898, 29; 1963, 162). For the vessels discovered in 1899, Mackenzie was more specific: '[they] turned up in deposit which had been left from last year above the level of the base of the pillar. Fragments of wall stucco also turned up on a level with the base of the pillar ...' (Mackenzie 1963, 167–8). His underlining of the word 'above' seems to indicate a wish to emphasize that the pedestalled bowls had been found in a context higher than the floor deposit containing fresco fragments associated with the base of the pillar. Evans, presumably reporting Mackenzie, later stated that 'Vases showing LM I influence were in fact found in a higher and later stratum above the floors of the Pillar Crypts on which these frescoes lay' (*PM* i. 547).[10] These observations would imply either that the pedestalled bowls had been deposited in the room after it had already fallen into disrepair, or that they had fallen into the room from an (unfrescoed) second storey when the building was in a state of collapse. Thus they confirm activity in the area during or after the date of their manufacture, but they do not provide a definite date for the abandonment of the second stratum building and offer only a rather imprecise *terminus post quem* for the date of the subsequent first (Mycenaean) stratum buildings.

Close attention should also be paid to the wording of Mackenzie's argument for dating the Pillar Rooms by reference to Knossos when he says that:

> All the Cnossian pillar-rooms belong in construction to the first great period of the palace ... cumulative evidence from Crete is sufficient warrant for assigning the Melian pillar-houses to the same general era (Mackenzie 1904, 261).

It is not immediately clear from this quote what palace Mackenzie had in mind. By 1903, Evans and Mackenzie's understanding of Knossos was that there had been an early and a late palace, and that the architecture of the later palace, which was much better preserved, could itself be divided into earlier and later phases (Evans 1903, 26 fig. 13). Thus 'the first great period of the palace' could mean either the first palace, or the first period of the second palace, with its more impressive architecture allowing it the connotation 'great'. The second reading is the more likely one, because Mackenzie specifically stated that at Phylakopi the Pillar Rooms post-dated contexts containing Kamares ware (Mackenzie 1904, 261). So, if the bird jugs are left to one side, it seems clear that Mackenzie and Evans thought that the

[9] Edgar provided the wrong room number when he stated that these vases were found in room 'F2:12 in the western pillar-chamber' (Edgar 1904, 137).

[10] Evans was almost certainly not using the word 'stratum' to identify an architectural stratum at Phylakopi, but in a more general sense to denote context.

Phylakopi Pillar Rooms were contemporary with the period of the early second palace at Knossos, which today would be dated to Middle Minoan IIIB—Late Minoan IB, or, in Cycladic terms, Middle Cycladic III–Late Cycladic II.

Mackenzie's use of the word 'construction' in the preceding quote also deserves some attention. It implies that Mackenzie thought the Pillar Rooms were built at the same time as the second palace at Knossos, and the general tone of his argument is that the Pillar Rooms were contemporary with those at Knossos, not that their abandonment coincided with the building of the second palace at Knossos. Evans too, in 1921, regarded the Pillar Rooms as Middle Cycladic III structures, not as Middle Cycladic structures that went out of use in late Middle Cycladic III. Thus both Mackenzie and Evans conceived of the Pillar Rooms as purpose-built structures, they did not consider them to constitute a late phase of refurbishment and/or use of a long pre-existing group of Middle Cycladic buildings. This point has important implications for the settlement history of Phylakopi, as Mackenzie reported only one layer of walls under the Pillar Rooms, which he judged to be third stratum, and thus Early Cycladic III First City. These implications will be returned to in the final discussion.

By 1974, when Renfrew commenced excavating at Phylakopi, doubts about Mackenzie's dating of the Pillar Rooms had already been expressed by Sinclair Hood, who suggested that the Pillar Room frescoes, and thus the Pillar Rooms themselves, would be more at home in a Late Cycladic I context (Renfrew *et al.* 2007, 50). Hood had proposed redating the frescoes because of what he took to be their associated pottery, not because of their style or iconography (Hood 1978, 53), but nevertheless, to test his hypothesis, Renfrew opened trench ΠS in room Atkinson 2 G3:11 immediately to the south and east of Pillar Room Atkinson 1 G3:6, with the express purpose of investigating the Pillar Room's date (FIG. 3) (Renfrew *et al.* 2007, 48 fig. 3. 29). Mackenzie had only excavated down as far as the bottom of the Mycenaean level in this room (DB 99 G3:22; Mackenzie 1963, 213, 217), and looks to have removed most of what he took to be Mycenaean walls; only one small piece of Late Cycladic III walling was extant when Renfrew commenced digging. About 1 m down Renfrew discovered a plaster floor, thought to be associated with the Pillar Room walls to the west and north. Fresco fragments were recovered from the layers above this floor, but none from the layers below. The floor was dated to Late Cycladic I (Davis and Cherry 2007, 301–2 fig. 7. 19), although a Late Helladic IIA sherd was found trodden into it. This floor sealed the foundation trench containing Late Cycladic I sherds of the south wall of Pillar Room Atkinson 1 G3:6. Renfrew concluded that the Late Helladic IIA sherd provided a *terminus post quem* for the fresco fragments found above, so that the frescoes could only have fallen from the walls of the Pillar Rooms during or after Late Cycladic II (Renfrew *et al.* 2007, 50–3). The sherds in the Pillar Room wall foundation trench indicated a Late Cycladic I construction date.

Thus, with the bird jugs excluded from consideration, there is no material basis, or at least none that is now discernible, for assigning a Middle Cycladic III date to the Pillar Rooms or a transitional Middle Cycladic–Late Cycladic date to their abandonment. Nor, by extension, is there any basis for dating City II-iii likewise. Renfrew's excavations have confirmed what a critical reading of Mackenzie's argument suggests: that although the Pillar Rooms were discovered in stratum two, they date to Late Cycladic I–II. This finding confirms that stratum two encompassed Middle Cycladic–Late Cycladic II remains and that the stratigraphical break between stratum two and stratum one should be dated to Late Cycladic II. Since Mackenzie

interpreted this break as evidence of a site-wide catastrophe, however, redating it to Late Cycladic II raises further questions about the nature and date of the catastrophe that ended the Second City.

The Second City Destruction

The argument thus far has focused on stratigraphy, and established that Mackenzie's 1904 division of the later Phylakopi sequence into City II and City III was not always warranted by the stratigraphical break he recognized during excavation between stratum two and stratum one. In some areas of the site, stratum two included Middle Cycladic–Late Cycladic II remains. In other areas, there was a discrete Late Cycladic I–II stratum intervening between stratum two and stratum one, although Mackenzie seems not always to have recognized it. The two stratigraphies are summarized in TABLE 6. It shows that Mackenzie's 1904 claim of a major site-wide break in stratigraphy between Middle Cycladic City II and Late Cycladic City III, with a less extensive break between Late Cycladic I–II City III-i-ii and Late Cycladic III City III-iii, cannot be sustained. If a major break did occur, it can only have been during Late Cycladic II, with a less extensive break at the Middle Cycladic–Late Cycladic transition—the reverse of what Mackenzie claimed. But Mackenzie did not just envisage stratigraphical breaks, he conceived of catastrophes (Mackenzie 1904, 263), and perhaps the material effects of catastrophe were as important as stratigraphy for forming his view of the site's history. Thus it remains to consider what evidence there is for a site-wide 'catastrophe', and, if there is such evidence, to determine its date.

The idea of a 'catastrophe' overwhelming the Second City (the then third settlement) was first mooted by Hogarth in the 1898 preliminary report, though he did not make much of it (Hogarth 1898, 11). Mackenzie's own stated view in 1898 was that 'one settlement at Phylakopi is superimposed upon the other without any violent break of continuity', though he was probably referring to cultural rather than architectural continuity (Mackenzie 1898, 29), leaving the question of catastrophe open.

By 1904, Mackenzie was interpreting the breaks in architectural continuity between Cities as evidence of abandonment and reoccupation. He argued that the 'fact' of three distinct architectural strata

> cannot be explained out of any gradual process of rebuilding such as goes on during the history of a town, for in that case, as has already been pointed out in connection with the Second City, we should have not two settlements with thorough-going stratification of their deposit, but one settlement with earlier and later elements (Mackenzie 1904, 263).

The end of the Second City could only be explained by a 'catastrophe', which was

> some calamity which overtook the settlement as a whole and led to a momentary abandonment of the town by all its inhabitants (ibid. 263).

The inhabitants then returned 'to repair the breaches and to rebuild the new town on the old lines' (ibid. 263).

Hogarth, however, did not mention catastrophes in 1904, while the other senior authors, Atkinson (architecture) and Edgar (pottery), seem to have been undecided about the possibility of periods of abandonment affecting the whole site. Atkinson, for example, suggested:

TABLE 6. Different stratigraphic sequences identified at Phylakopi.

Daybook stratum	**Three strata areas (e.g. Renfrew trench (IIC)**	**Four strata areas (e.g. Renfrew trench IID I/IIE)**
Stratum 1	LC III	LC III
Stratum 2	MC–LC II	LC I–II
		MC
Stratum 3	EC III	EC III

Thus at different levels are found three series of buildings apparently unrelated to one another except that the builders of one period used the walls of the preceding age as foundations where they could conveniently do so. These phenomena admit of more than one explanation. It may be supposed that the town was partly or wholly destroyed and perhaps deserted. On the other hand there may have been merely a gradual and normal rebuilding (Atkinson 1904, 25–6).

And that:

The destruction may have been peaceful and deliberate in order to make way for better buildings, or it may have been caused by fire, by sack at the hands of the enemy, or by slow decay through desertion. Whether or not evidence of any of these misfortunes, supposing they befell, was to be expected, little or none was forthcoming (ibid. 28).

Moreover, he emphasized that in his chapter he deliberately used the term Period rather than settlement to avoid the implication of intervening episodes of desertion (ibid. 28).

In a similar way, Edgar seems even to have doubted the existence of discrete settlements:

We speak of three strata, but that does not mean that we find three well-defined and widely separated floor-levels all over the site and that the pottery occurs only at those levels. Naturally not. The ground does not remain at one and the same level during the whole long existence of a primitive village. The floors and the streets gradually rise, and not at a uniform rate in every quarter; rubbish heaps accumulate; roofs and walls fall in; alterations and repairs are constantly going on (Edgar 1904, 162).

Thus, to a greater or lesser extent, Atkinson and Edgar agreed with Mackenzie about the reality of three architectural strata, but they were less than certain about the cause of stratigraphical breaks. The evidence of catastrophe, if it existed, cannot have been overwhelming in their eyes.

As already described, the only City II-iii area that Mackenzie discussed in any detail, and thus the only potential Second City destruction context now open to evaluation, was that of the Pillar Rooms (Mackenzie 1904, 260–2, 269), though at the time of excavation he did not record any clear material evidence of destruction. He noted that the frescoes decorating room G3:6 must 'have gradually fallen on the floor or on the deposit gradually forming above it' (Mackenzie 1963, 166, n. 2), and that 'the house to which it belonged had been abandoned and fallen into decay' (Mackenzie 1899, 3). Hogarth, in his diary, records the absence of pottery in Pillar Rooms Atkinson 1 G3:6,11,17, but also that they contained 'just plain earth'.[11] 'Plain earth' might have been collapsed and compacted mud-brick or mud-plaster,

[11] Diary entry for Wednesday, 25 May. I am grateful to Professor Caroline Barron for allowing me to study this diary.

perhaps from the putative second storey, but it seems a clear enough indication that the rooms did not contain any stone tumble of a type that might indicate violent demolition. Thus the excavation record is equivocal at best about destruction. There was no evidence of burning, for example, of the type associated with the remains of the City III-iii Megaron (Mackenzie 1963, 184), or found in other contexts.

In fact, it is surprising that in 1904 Mackenzie made no reference to what had been the clearest evidence of destruction found during the excavation, even termed as such at the time in his daybook, which was the layer of burnt debris containing pre-Mycenaean (Theraean) pottery and fresco fragments found at the base of the south face of the Fortification Wall in squares BC5 and running under the Fortification Wall bastion in B5 (Mackenzie 1963, 33–7). Writing before he had adopted his terminology of strata, from the evidence of the pottery Mackenzie believed that the Fortification Wall had originally been built in the pre-Mycenaean period (ibid. 42–3), and after a 'conflagration that may have caused the partial destruction of the citadel' (ibid. 37) at the end of the pre-Mycenaean period, it had been repaired and augmented and the bastion had been added (ibid. 42–3). The deposit containing burnt debris and fresco fragments found outside the wall had presumably been dumped there as part of the rebuilding operation (ibid. 34). If the later equation of Theraean pottery with Edgar's classes 'Early Mycenaean Style with Designs in Matt Black' and 'Early Mycenaean Period with Designs in Black and Red' (Cycladic White) and 'Later Local Pottery of the Mycenaean Period' (Later Local) holds, then the Fortification Wall would have been slighted some time during Middle Cycladic–Late Cycladic II and rebuilt during Late Cycladic III. As there was nothing to suggest an interval of time lapsing between the two events, they should both most likely be dated to the Late Cycladic II–III transition.

This destruction event, if such it was, might have been broadly contemporary to another putative destruction that affected the south of the site. In 1911 Dawkins and Droop discovered in area H4 that floors in two rooms had been burned and covered with a fill of broken pottery that extended to a further five rooms, connected by sherd associations (Dawkins and Droop 1911; Barber 1974, 13, 15; Brodie *et al.* 2008, 454 fig. 38. 4). This fill included some Late Minoan IB/Late Helladic IIA pottery and should therefore be dated to Late Cycladic II.

Dawkins and Droop (1911) also excavated beneath the Megaron floor, which had been left largely intact by Mackenzie, where Dawkins described the pottery as 'Utter mixture. Dump to make palace floor' (Dawkins 1911). Renfrew has now dated the construction of the Megaron complex, and so presumably also the dump under the Megaron floor, to Late Helladic IIIA1 (Renfrew *et al.* 2007, 23). A few metres to the south-east of the Megaron complex, Mackenzie had encountered what must have been a similar fill deposit in his second stratum/City III-i rooms Atkinson 1 J3: 2, 7 (DB99 J3:2, 3) (Mackenzie 1963, 196, 198–9), and Hogarth suggested that the generally good state of preservation of City III-i buildings in this area was due to their artificial filling prior to the construction of the Megaron (Hogarth 1904, 20). Renfrew and Mackenzie both reported a layer of charcoal or charred wood just above Late Cycladic I–II floors in Megaron room Atkinson 2 J1:13 (DB98 J1:3; Renfrew's trench IIC) (Mackenzie 1963, 104; Renfrew *et al.* 2007, 43–4 fig. 3. 23).

Thus while there is no compelling evidence of a Middle Cycladic Second City destruction, there are at least three observed archaeological complexes (the ceramic fills under the Megaron and its nearby buildings, the repairs and extensions of the Fortification Wall, and

the burnt floors and ceramic fills in H4) that indicate an architectural break and a destruction that can be accommodated within the chronological bracket Late Cycladic I–IIIA. This evidence corroborates the arguments set out above that the major stratigraphic break should date to Late Cycladic II. The evidence is probably not enough to provide conclusive proof of a site-wide destruction at this time, though it is certainly open to interpretation as such. Thus, while Driessen and Macdonald would prefer to see a Late Cycladic I destruction affecting the Pillar Rooms and the Megaron area, followed by a more limited Late Cycladic II destruction in area H4 (1997, 254), Barber thinks the evidence is better taken together with the building of the Megaron as the work of 'hostile Myceneaeans' at the LC II–III transition (Barber 1999, 137). A small amount of Late Helladic IIB pottery has been discovered at Phylakopi (Mountjoy 2007), and perhaps in future a seriation analysis of the type pioneered by Davis and Cherry (2007) for Late Cycladic I pottery applied to Late Cycladic II pottery might allow the contemporaneity or otherwise of Late Cycladic II ceramic fills to be assessed.

Whitelaw has worked hard to date the Second City destruction to the Middle Cycladic–Late Cycladic transition, but his case mostly relies on the assumption that Mackenzie would have accurately identified evidence of a site-wide destruction particularly because of 'the scale of the debris layer (1–2 m thick), which represents the City II level all over the site' (Whitelaw 2005, 46). But Mackenzie's major stratigraphic break was between stratum two and stratum one, and so the debris layer would actually have represented the remains of stratum two, not City II. As shown above, City III-i–ii remains were regularly found in stratum two, and so the debris layer defining the end of stratum two must date to Late Cycladic II. Whitelaw, to support his argument for a Middle–Late Cycladic destruction, refers to Atkinson's observations as follows:

> Mackenzie recognized this as a raft of debris on which City III-i was rebuilt. This was noted by Atkinson as being far more substantial than the debris level marking the destruction of City I-iii, which may be a reflection of more frequent two-storey houses in City II (Whitelaw 2005, 46).

But Atkinson was not writing about City II, he was writing about his own Period 2, and Atkinson's Period 2 plan incorporates Late Cycladic I–II contexts, including, crucially, Atkinson 1 J3:2, 7 and areas under the Megaron, where in both cases Late Cycladic II ceramic fills have been reported. And although Atkinson did mention the existence of debris on the site (Atkinson 1904, 25, 28), for Period 2 he used the word 'rubbish':

> At the second rebuilding the walls were left standing to a greater height, a level platform of rubbish was formed, and the new walls were built sometimes on top of the old walls, sometimes on the rubbish filling the intervals between them (Atkinson 1904, 28).

As previously noted, Atkinson was sceptical about destructions, and while his observation here could easily describe simple levelling carried out in advance of building operations, he may have chosen the term 'rubbish' deliberately, instead of 'debris', to describe ceramic fills of the type previously noted. If Atkinson was being careful with his words in this way, and if his 'platform of rubbish' was extensive, it would imply that Late Cycladic II ceramic fills were more widespread than has previously been supposed.

Whitelaw has also observed that Mackenzie's daybooks note several examples of 'burnt destruction debris on the City II floors', but his claim that Mackenzie 'considered the accompanying ceramics to be contemporary, and also linked this material to a large dump of

burnt debris immediately outside the Fortification Wall' (Whitelaw 2005, 41) may be reading too much into Mackenzie's account. One burnt deposit was discovered in Atkinson 1 E3:16 (Mackenzie 1963, 91, 92), the location of an 1898 deep sounding. At the end of the first half-metre, just below the Mycenaean pavement, there was a black layer with charcoal running through it, which Mackenzie interpreted as 'debris on which the Mycenaean settlement was built', noting that a similar charred deposit had been found under the bastion in B5, and emphasizing that there too, the deposit had been found directly underneath the 'real Mycenaean stratum' (ibid. 93 n. 5). The Atkinson 1 E3:16 deposit was in an area (DEF2–3) and at a level that in 1904 Mackenzie identified as the stratigraphic interface between City III-i and City III-iii (Mackenzie 1904, 267). Thus if this burnt deposit was evidence of a destruction, it would indicate the destruction of City III-i-ii, and date to Late Cycladic II. Mackenzie went on, however, to point out the unusual quantity of animal bones associated with the deposit, which he thought derived from a kitchen. He also linked a layer of charred wood found just below the Mycenaean flooring in corridor Atkinson 2 C5:11 to the deposit found outside the Fortification Wall (DB97 C5:2; Mackenzie 1963, 60).

Not linked to the Fortification Wall deposit by Mackenzie was the Late Cycladic I/II layer of charred wood already referred to in the Megaron room Atkinson 2 J1:13 (DB98 J1:3; Mackenzie 1963, 104–5). At least two other burnt deposits (in rooms Atkinson 2 G1:7 and Atkinson 2 G2:26) were noted intervening between stratum two and stratum one, and thus probably dating to the end of City III-i-ii (Mackenzie 1963, 120 = DB 98 G1:2; 150 = DB 98 G2:6), though they were not linked by Mackenzie to any larger horizon, and several further burnt deposits were identified in first or second stratum levels, though not obviously interposed between them.

Other contexts noted by Whitelaw were:

Atkinson 1 F2:16; DB98 F2:6 (Mackenzie 1963, 133). At a depth of 2.6 m, 1.8 m below what was thought to be the 'Mycenaean' floor level, there was a stratum two floor with traces of burnt wood and ashes. The context was associated with pre-Mycenaean pottery.

Atkinson 2 F2:24; DB98 F2:18 (Mackenzie 1963, 135). There was a possible floor series between 2.30 and 2.90 m beneath the ground surface associated with stratum two walls, with a layer containing charred wood just beneath the lowest floor. Thus the burnt layer would have predated any putative stratum two destruction.

Atkinson 1 G2:10; DB98 G2:10 (Mackenzie 1963, 154). At a depth of 3.0 m, 1.8 m below a floor of unspecified date, there was a stratum two floor with ashes and charred wood.

Thus while the evidence for a site-wide destruction is not conclusive, there is certainly evidence for Late Cycladic II episodes of destruction and rebuilding, which augments the stratigraphic argument for a major Late Cycladic II break. Against that, there are no obvious destruction deposits that can be dated to the Middle Cycladic–Late Cycladic transition. And while Mackenzie might not have thought that the areal extent of the Late Cycladic II 'catastrophe' intervening between City III-i-ii and City III-iii was sufficiently large as to warrant considering City III-iii a separate City, he certainly thought the break in cultural continuity was sharper than that associated with either of his main City transitions (Mackenzie 1904, 269). It is the only one to which he attributed a cause, suggesting it to be the work of an invading Mycenaean dynasty, part of a broader historical movement which also caused the destruction of the later palace at Knossos (ibid. 1904, 269–71).

Concluding Discussion

Renfrew was broadly correct to suggest that Mackenzie's attribution of Late Cycladic I–II architectural remains to Cities was inconsistent, though the attributions may have been less confused than he first thought. Comparison of Mackenzie's 1904 chapter with his relevant daybook entries shows that although Late Cycladic I–II contexts were consistently found located in the second stratum, most were later categorized as City III-i. The Pillar Rooms stand out as the only identifiable Late Cycladic I–II context found in the second stratum that was assigned to City II, to become the only specified City II-iii context. Why Mackenzie chose to relocate second stratum contexts into his Third City in apparent disregard of the observed excavation stratigraphy is open to speculation. It has already been suggested that the continuing use or reuse of MC walls by LC I–II floors might have taxed his methodology. Also, the three-strata/settlement model developed early in the excavation was not flexible enough to accommodate the more complex stratigraphy observed later. Even by the time of the 1898 preliminary report Mackenzie was beginning to argue that his fourth (Mycenaean) settlement comprised two phases (Mackenzie 1898, 33). Perhaps, had he started the 1896 excavation in the Megaron, he might have devised a different stratigraphic system. His accumulating knowledge of finds at Knossos and particularly of the Minoan ceramic sequence was also influential in his later interpretations of Phylakopi.

Assessments of Mackenzie's ability as an excavator, when judged against that of his contemporaries, are consistently positive (e.g. Momigliano 1999, 23–5; Renfrew 1963, p. v; Whitelaw 2005, 44), and these negative comments about his methodology at Phylakopi are not meant to contradict those assessments. But Mackenzie learnt his trade at Phylakopi, where he worked for 16 weeks in total between 1896 and 1899, compared with Knossos, where, by the end of the 1903 season (when he wrote his chapter in *Excavations at Phylakopi*), he had put in something like 58 weeks' work. The positive effect of this accumulating experience on his standards of excavation and recording is evident in his Knossos daybooks, where his 1904 discussion of the importance of floor levels and associated stratigraphic section (reproduced in Momigliano 1999, 52 fig. 19) evinces a more sophisticated grasp of methodology than anything written (or drawn) in the Phylakopi daybooks.

The Pillar Rooms raise broader questions about the nature of Middle Cycladic settlement at Phylakopi. Mackenzie seems to have regarded the Pillar Rooms as an architectural unit within the broader City sequence, and most subsequent scholars have agreed that they were planned and constructed with a specific purpose in mind. But what existed on the site of the Pillar Rooms before the Pillar Rooms themselves? The answer to this question is important because it can shed light upon the nature and development of occupation at Phylakopi more generally.

Mackenzie discovered lower walls under Pillar Rooms Atkinson 1 G3:6 and G3:4, which, in room G3:6 at least, were associated with 'typical third stratum pottery', and therefore would be dated to the First City (Mackenzie 1963, 169). Thus, if Mackenzie was correct about the date of the lower walls, and if the Pillar Rooms were built and abandoned within the period Late Cycladic I–II, this area would have been occupied in Early Cycladic III and then abandoned until Late Cycladic I, a period of as much as 500 years. The possibility of such a long period of abandonment should not be ruled out, as Atkinson drew attention to a deposit of earth in many parts of the site separating City I from City II (Atkinson 1904, 28).

Renfrew's excavation in trench ΠS suggests another scenario. Unfortunately, it was

terminated once the date of the frescoes had been established, i.e. not taken to bedrock, but a lower wall cut through by the foundation trench of a Pillar Room wall was dated to Middle Cycladic (Renfrew *et al.* 2007, 52, fig. 3. 30). If Renfrew is correct, then perhaps the earliest building on the Pillar Rooms site was not Early Cycladic III but Middle Cycladic, as is now thought to have been the case on southern areas of the site not excavated by Mackenzie (Brodie *et al.* 2008, 412–14; Whitelaw 2004, 155–6).

A third scenario would be that the construction of the Pillar Rooms entailed the complete removal of any pre-existing Middle Cycladic walls. This possibility cannot be dismissed out of hand, although in most areas the lower courses of built-over walls do seem to survive, and it does raise yet a further series of questions about the ability of Mackenzie to recognize evidence of wall removal and the effect of any failure to do so on his understanding of the site's stratigraphy.

As already mentioned, many of the rooms on Atkinson's Second Period plan were in fact allocated by Mackenzie to his Third City, and should therefore be dated to Late Cycladic I–II, not to Middle Cycladic (e.g. Atkinson 1 J3:2, 7 and associated rooms to the west). Other walls on Atkinson's Second Period plan have been shown by Renfrew to be Middle Cycladic in date, though reused in Late Cycladic I–II (e.g. Atkinson 1 J1–2:1, 8, 10). And then there are the Pillar Rooms, also dated to Late Cycladic I–II. Therefore the areal extent and residential density of Atkinson's Second Period town, if it is taken to represent Middle Cycladic Phylakopi, might be illusory. A large part of the planned architecture can only have dated to late Middle Cycladic, at the earliest, or perhaps even to early Late Cycladic. Thus although the ceramic evidence attests well enough to Middle Cycladic occupation of Phylakopi, the nature of that occupation remains to be properly established. Phylakopi would not have achieved maximum area and population until late in the Middle Cycladic period (cf. Whitelaw 2004, 156), and that town would not have suffered any widespread destruction or rebuilding until late in Late Cycladic I or Late Cycladic II.

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THE LATE MINOAN II–III AND MYCENAEAN POTTERY FROM THE 1911 EXCAVATIONS AT PHYLAKOPI ON MELOS[1]

As a result of three sets of excavations carried out by the British School at Athens at Phylakopi in 1896–9, 1911, and 1974–7, an outline of the history of settlement at the site in the Late Bronze Age is now possible. In brief, it seems that at the beginning of the LBA the newly built Third City of Phylakopi had much LM I A influence in architecture, frescoes, and pottery. However, in the next phase, LM I B/LH II A, the influence swung to the Mycenaean mainland, probably as a result of the disruption of trade after the loss in the Thera eruption of the busy emporium of Akrotiri, where goods from Crete entered the Cyclades. In this phase Mycenaean connections were particularly manifested in the pottery, some of which included exact copies of Minoan vessels, which clay analysis has shown were made on the mainland (Mountjoy 1999*a*, 21). Indeed, from now until the end of LH III B the bulk of the fine decorated pottery at Phylakopi was imported Mycenaean. The LH II A pottery includes a staggering amount of Marine Style with nearly 90 vessels represented. Some of this pottery was caught in a destruction at the site; vases come from destruction deposits with some burning in four rooms (Barber 1974, H4/22 and H4/25, 26). The extent of the destruction was unclear, but recent work suggests that it covered the area of H4 between Streets A and B and appeared at other places on the site (Brodie *et al.* 2008, 414–15). In the following LH II B phase or in LH III A1, a mansion with a megaron of Mycenaean type was constructed above a LC I mansion. In LH III A2 the West Shrine was built against the fortification wall on the south side of the town. It has been suggested that the large wheelmade cult figure found in the shrine was an Argive import (Mountjoy 2007, 215). In LH III B a new fortification wall was constructed, as well as the East Shrine; local production of Mycenaean pottery began in the form of jugs and hydriai. In LH III C all the Mycenaean pottery was locally produced. The use of the shrines is well documented in this period with a phase of use, Phase 2a, ending in a destruction in Phase 2b, possibly as the result of an earthquake. The shrines continued in use in Phases 3a–3c before being abandoned, possibly early in LH III C Middle Advanced.

The 1911 excavations of Dawkins and Droop were undertaken with the aim of recovering a pottery sequence. In addition to some trial trenches, they dug a trench below the floor of the Megaron revealed by the 1896–9 excavations and excavated a large area H4–5, G5 on the south side of the site, which became known as H4. None of the Mycenaean and Late Minoan pottery from the 1911 excavations is stratified, apart from five vessels isolated by Barber as belonging to the LM I B/LH II A destruction horizon (1974, 14–16, 46–7, 51). Only the fine decorated material from the site has been kept, together with some monochrome material and just a very few fine unpainted pieces; unfortunately, most of the linear body, base, and rim sherds needed to reconstruct vessels have not been kept. Some of the vessels and some large

[1] I should like to thank Dr R. Barber for inviting me to undertake the study of this pottery and for his help in locating the sherd material, as well as for much useful discussion. This article should be seen as a sequel to Barber 2008, which publishes the earlier material from the 1911 excavations. I should also like to thank Dr B. Hallager and Dr E. Hatzaki for their helpful comments on the Minoan pottery. The study of the pottery on Melos was undertaken with the aid of a Small Research Grant from the British Academy, to whom I am very grateful. I should also like to express my gratitude to Dr M. Marthari for permission to work in the Melos Museum Storeroom and to the Museum staff for much practical assistance.

sherds have the original excavation numbers and/or a Melos Museum (MM) catalogue number. The bulk of the material is unpublished, apart from a selection of sherds (Dawkins and Droop 1911, pl. 14) and some complete vessels (ibid., pls. 11–12 and fig. 2). I have illustrated some of the material in Mountjoy 1986, 1999*a*, and 2007; it is included here to give a complete corpus. As only the fine decorated pieces have been kept, tables with statistics of shapes and motifs are not presented. The Mycenaean sherds illustrated in Dawkins and Droop 1911, pl. 14 are all missing, together with other sherds shown on early negatives in the BSA Archive. Moreover, the assignation of some material to the 1911 excavations is not certain, as one or two sherds might belong to the 1974–7 excavations (see Barber 2008, Appendix).

The material adds to our knowledge of the LB phase at Phylakopi. It also fills gaps in the corpus of pottery provided by the 1896–9 and 1974–7 excavations. The LH III A2 phase in particular was poorly represented, a matter of surprise since this was the phase of Mycenaean expansion; the 1911 material now adds a number of pieces of this phase to the corpus. It also has a large amount of LH III A1 and LH III C pottery. The latter is of particular interest for the parallels it has to that of Koukounaries on Paros and Aghios Andreas on Siphnos, which have led me to suggest a possible pottery koine in this part of the Cyclades (Mountjoy 1999*a*, 45, 932–3); in addition, there are just one or two parallels to locally made pottery from the east Aegean and to pottery exported from there to Ugarit in the Levant.

The Minoan Pottery

The LM I material is discussed by Barber (2008) as it is closely akin to the LC I material. The later Minoan material consists only of 24 sherds, most of them scraps difficult to assign to shape and motif. Four pieces can be assigned to LM II, seven each to LM III A1 and LM III A2, and six to LM III B. Surprisingly, the LM III A1 material includes a sherd from what must have been an extremely large jar decorated in the so-called Palace Style, as well as sherds from two similar but smaller vessels. Five of the LM III A2 sherds belong to open vessels, which must have been traded as fine table-ware. The LM III B material shows contact with western Crete in the form of two Chaniot imports. However, the corpus is too small to allow conclusions to be drawn as to the nature of Minoan trade in the Cyclades during these pottery phases (see Kanta 1980, 294–313 for a summary of LM III Minoan trade).

LM II (FIG. 1)

Pyxis

1 belongs to this straight-sided vessel; the sherd is curving in at the bottom to the flat base (see Mountjoy 2003, fig. 4. 26. 433–34 for the base). The decoration of quirk may be a filling motif below a main motif, such as on examples from Knossos (Mountjoy 2003, fig. 4. 26. 428, 435).

1 Buff;[2] greenish slip, black paint. Quirk.

Beaked jug

2 has rock pattern with fill of semicircles; there is a wavy line on the neck and at the base of the neck. The open ground decoration on the body suggests a date in this phase. **2** is not

[2] The first colour always refers to clay.

FIG. 1. LM II: **1** pyxis, **2–3** beaked jug, **4** cup; LM IIIA1: **5–7** jar, **8–10** beaked jug, **11** cup.

Mycenaean, since the LH II B jug is a plump shape (Mountjoy 1986, fig. 47), whereas **2** has the narrow conical-piriform LM II shape (Popham *et al.*, pls. 60 *b–e*, 61 *a–e*); **3** has flower with a thick calyx and blob ends to the stamens similar to examples from Knossos (Popham *et al.*, pl. 165. 48–9).

2 Grey fired pinkish; buff slip, red-brown paint. Rock pattern on shoulder, wavy line on neck.

3 Buff; fugitive chocolate brown paint. Flower.

Cup

There are parallels to the decoration on **4** on LM II cups from Knossos (Popham *et al.*, pl. 156. 5, 7).

4 Buff; no slip, matt orange paint. Lunettes in stipple pattern.

LM III A1 (FIG. 1)

Jar

The section of **5** is 1.5 cm thick, whereas that of the large jar is usually about 1 cm. The huge papyrus also suggests a very large shape. The simple frame to the head of the papyrus and the lack of stamen tips suggests a date later than LM II (compare with a papyrus on a LM III A1 vase in Alexiou 1967, pl. 5, with motif drawn by Niemeier 1985, fig. 14(2). 29). The thick sections of **6–7** suggest they belong to this shape. **6** may have a version of linked whorl, such as on a jar from Knossos (Niemeier 1985, pl. 8. XVIII A1, motif fig. 7.13). **7** has a motif that seems to resemble the earlier sacral knot (Niemeier 1985, LM I B fig. 57. 21–4). The edge of a cluster of flowers can be seen at the top of the lefthand sherd; there may have been another above the knot on the right-hand sherd. The outlined curves are similar to those of volutes on a krater from the Knossos South House (Mountjoy 2003, fig. 4. 36. 619).

5 Coarse greenish packed with brown grits and one or two white; fugitive crackled black paint, once lustrous. FM11, papyrus.

6 Buff with many small brown grits; orange-brown paint. Silver mica. ?Linked whorl.

7 Grey fired orange; buff slip, matt orange paint. Sacral knot alternating upright and inverted.

Beaked jug

The ridge at the base of the neck and the wide shoulder suggest **8** might belong to a small example of this shape. It has a papyrus bloom with the top of the coils flanking the stem visible beneath it. There are parallels from Knossos, such as on a conical piriform jar from the Tomb of the Double Axes (Evans 1914, fig. 66 *a*; see also Popham *et al.*, pl. 168. 110–12), but the shape of **8** is much smaller, perhaps akin to examples from the Unexplored Mansion (Popham *et al.*, pl. 59 *m–n*). **9** may have retorted spiral with dot rosette fill (Popham 1970*a*, fig. 14. 94).

10 seems to have iris zigzag with fill of arcs (see Popham1970*a*, fig. 13. 67 for the motif and Mountjoy 2003, fig. 4. 37. 655 for the fill).

8 Buff; fugitive black paint with added white. FM 11, papyrus.

9 Buff; white slip, matt dark brown paint. ?Tip of retorted spiral with dot rosette fill.

10 Buff; pale yellow slip, orange paint. Iris zigzag with fill of arcs.

Rounded cup

The small size of **11** suggests it may belong to a rounded cup. Not enough of the exterior decoration is preserved to know if the blobs are a filling motif or a main motif. The paint on the interior is monochrome, but just verging on stipple, a feature of this phase on Minoan cups (see Mountjoy 2003, fig. 4. 37 for examples).

11 Grey fired pinkish; buff slip, orange paint. Blobs, monochrome/stipple interior.

LM III A2 (FIG. 2)

Closed shape

Not enough of **12–13** is preserved to allow a positive identification of shape. **12** has a stemmed retorted spiral with solid centre and **13** a version of flower with long calyx.

12 Soft buff; matt red-brown to black paint. Retorted spiral.
13 Buff fired orange; creamy slip, black to brown paint. Flower.

Rounded cup

A few sherds can be assigned to this shape **14–17**. **14** has groups of semicircles. **15** has diagonal lines, which are probably the base of foliate band rendered as a horizontal chevron, such as on a vase from Knossos (Warren 1983, 72, fig. 22 top left; for a complete version see a deep bowl in Popham *et al.*, pl. 114 *b*, which could be LM III A2 or early LM III B). The spiral on **16** has the stem touching the back of the next spiral in the Minoan fashion instead of blending into it as on Mycenaean vases, but the stem joins the next spiral at the base instead of halfway up it; this suggests that the spirals may be running to the left instead of to the right as is usual (for the motif see Popham *et al.*, pl. 173. 31–2). Similarly to **15**, part of the handle ring is present on the right edge of the sherd. The motif on **17** is uncertain, as only the edge is extant.

14 White; deep buff slip, semi-lustrous orange paint. D. (rim) 17. Semicircles.
15 Buff; black to brown paint. Foliate band, edge of handle ring on right.
16 Buff; brown paint. Much silver mica. Spiral, edge of handle ring on right.
17 Pink-buff; pale yellow slip, red-orange paint. Edge of decoration, monochrome interior.

Krater

There is a rare example of the krater **18**. The shape is possibly similar to a vase from Knossos with globular upper body and short, fat everted rim (Popham *et al.*, pl. 174. 1). It depicts concentric arcs attached to the rim and belly bands; they may well be fill in tricurved arch.

18 Buff fired pinkish; pale yellow slip, orange paint. D. (rim) *c.*23. Concentric arcs.

LM III B (FIG. 2)

Stirrup jar

The stirrup jar **19** is Chaniot (I thank B. Hallager for this information). It has the Minoan flower with long fringe (see Popham 1970*b*, 200, fig. 3. 29–35 for examples). Another piece of this vessel, which shows the complete flower, is illustrated Dawkins and Droop 1911, pl. 14. 56; it is, unfortunately, missing. **20** has the Minoan banded body with bands of roughly equal width all down it (see Kanta 1980, figs. 25. 3, 59. 4 for examples), rather than the Mycenaean syntax, which has fine line groups between the bands (Mountjoy 1986, figs. 127–31).

19 Grey fired yellow; red-brown paint. Flower. Chaniot.
20 Grey fired pink-buff; buff slip, lustrous brown paint. Flower.

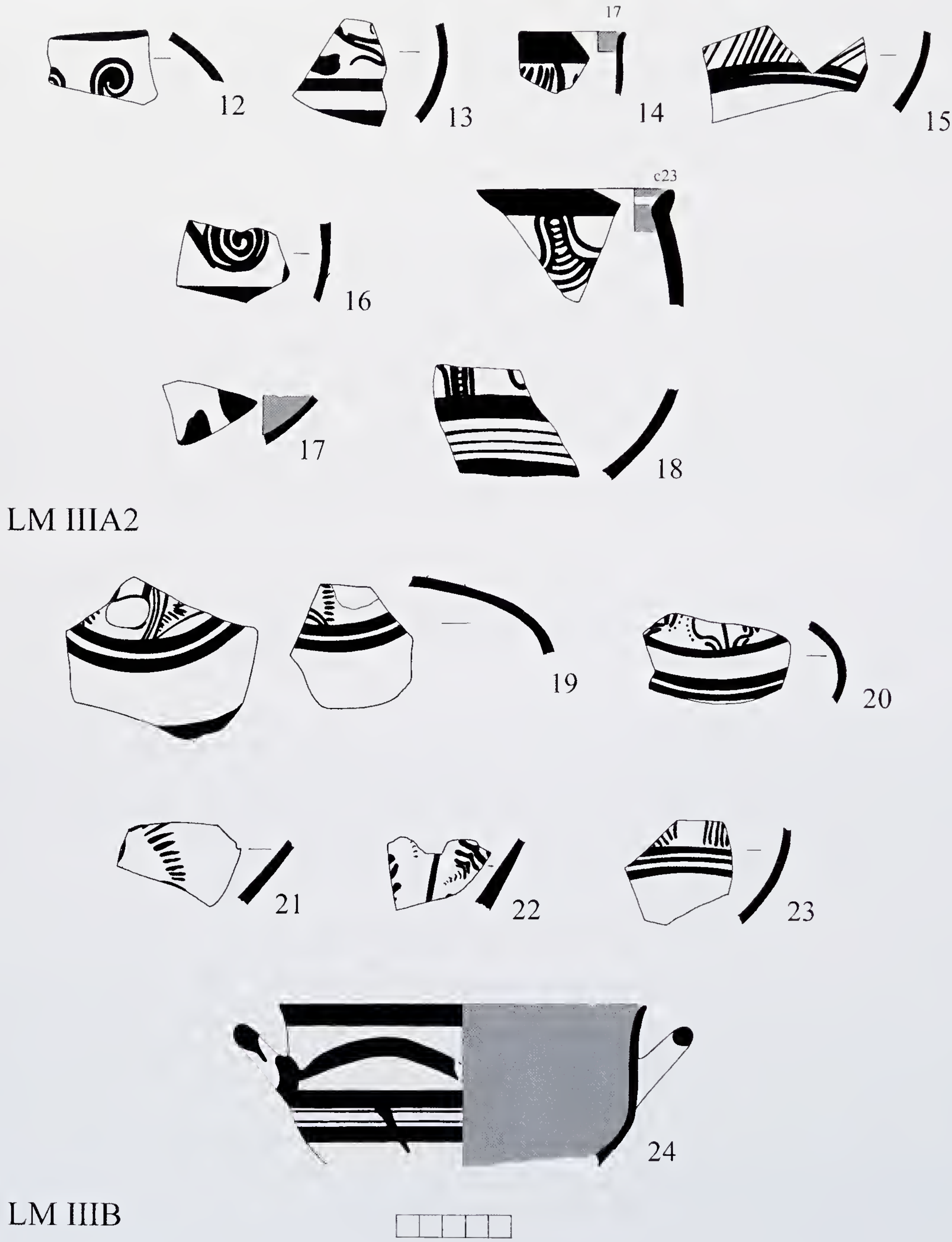

FIG. 2. LM IIIA2: **12–13** closed shape, **14–17** cup, **18** krater; LM IIIB: **19–20** stirrup jar, **21** krater, **22** kylix, **23–24** deep bowl.

Krater

21 is a Chaniot import (I thank B. Hallager for this information). It belongs to an unusually large vessel. It has a similar fringed flower to that on **19** (see also kraters from Chania: Kastelli with fringed flower, Hallager and Hallager 2003, 218–20 and pl. 58. 82-P0286 (+70-P0934), 87-P0071, 84-P0950).

21 White; pale yellow slip, brown orange paint. Flower. Chaniot.

Kylix

The kylix **22** has chevrons flanking what may be a whorl tail.

22 Whitish fired buff; deep buff slip, red-orange paint. Chevrons flanking ?whorl tail.

Deep bowl

23 has groups of semicircles composed of many fine strokes. There is a parallel on a deep bowl from Chania: Kastelli (Hallager and Hallager 2003, pl. 51. 80-P0680). The shape of **24** is not that of the semi-globular Mycenaean deep bowl (Mountjoy 1986, fig. 143), but rather it has the wide shallow body of the Minoan bowl (Hatzaki 2005, 166, fig. 4. 26. 11). B. Hallager has suggested to me that **24** may be early LM III B from central Crete.

23 Buff; whitish slip, orange-brown paint. Semicircles.
24 Buff; lustrous black to brown paint. D. (rim) 16. FM 53, wavy line, monochrome interior.

The Mycenaean Pottery

LH I (FIG. 3)

The Mycenaean LH I ware, i.e. pottery decorated in the Mycenaean style, circulated together with a number of other wares; the Mycenaean ware made up only a very small part of the corpus (see Mountjoy 1999*a*, 18–20 for an overview). It is, thus, not surprising that there is very little LH I pottery at Phylakopi. The LH I pottery from all three sets of excavations consists mostly of the Type II Vapheio cup with just a few examples of other shapes (see Mountjoy 2007, 325–6 for an overview). It is all imported. By far the most popular motif on the Vapheio cup is the tangent spiral with blob fill.

Hole-mouthed jar FS 100

25 with stone pattern could be LH I or LH II A. An example from a large jar from the 1896–9 excavations is assigned to LM I A, as it has thin added white paint (Mountjoy 2007, pl. 36 *e*. 301). There is no trace of white paint on **25**, but, since it has similar stone pattern, I have assigned it here to LH I. However a LH II A date cannot be ruled out. The section of **25** is not thick enough for the large jar, but it could belong to a large hole-mouthed jar, such as examples from the 1896–9 excavations (Mountjoy 2007, fig. 8. 14. 313–14).

25 Buff; shaded-brown paint. FM 76, stone pattern.

Cup, deep semi-globular FS 211

The rough interior and single shaft of the double-axe (FM 35.5) suggest a LH I date for **26**. It may belong to the flat-based FS 211, since this is more common than the stemmed FS 212

FIG. 3. LH I: **25** hole-mouthed jar, **26** cup, **27–31** Vapheio cup Type II, **32–33** Vapheio cup Type III.

(see Mountjoy 1986, fig. 7 for examples). A flat base of FS 211 with double-axe with a single shaft is now missing (Dawkins and Droop 1911, pl. 14. 12).

26 Buff; crackled black paint. FM 35.5, double-axe.

Vapheio cup FS 224

The stratigraphy of Kastri on Kythera has enabled the Vapheio cup to be separated into three different types (Coldstream 1978, 393,395, fig. 6). Types II and III are present at Phylakopi.

Type II

There are numerous examples of the Type II Vapheio cup at Phylakopi (Mountjoy 2007, fig. 8. 14. 317–19, 157–8). All have the rough, i.e. un-slipped interior which is a criterion of this phase. Type II is the type with bulging midrib and a broad base, often bevelled, although **27** is not. Tangent spiral with blob fill is the commonest motif on this shape, **27–8**, and probably **29** and **31**. The handle on **27** is decorated with long diagonal leaves. **30** has simple running spiral with dots between; it is a relatively popular motif (Mountjoy 1986, fig. 8. 5). For other motifs see (Mountjoy 2007, fig. 8. 14. 318–19, 157–8).

27 Buff; white slip, black paint. D. (rim) 11, (base) 6.9, H.7.5–8. FM 46, tangent spiral with blobs. Inv. 107.
28 Buff; greenish slip, fugitive black paint. D. (rim) 12. FM 46, tangent spiral with blobs.
29 Buff; greenish slip, black paint. D. (rim) 13. FM 46, spiral.
30 Buff; black paint. D. (rim) 8.2. FM 46, running spiral with blobs.
31 Buff; greenish slip, black paint. FM 46, running spiral.

Type III

This type has a narrow cylindrical lower body and very flaring upper body with shallow midrib. I have previously dated **32** to LH II A (Mountjoy 1999*a*, Melos no. 39; 2007, fig. 8. 17. 362), since the rough interior is also found on LH II A Vapheio cups with ripple decoration (see Mountjoy 2007, 332 for discussion). However, I have now been able to identify the base of **32** in the sherd material. The wavy outline to the ripple, which is an early feature in the LM I A tradition, is very obvious on the base, suggesting the vase should be reassigned to LH I.

32 Brick; buff slip, orange paint. D. (rim) 12.6, (base) 5.2, H.8.7–9.2. FM 78, ripple. Inv. 115. Mountjoy 1999*a*, Melos no. 39; 2007 8.17.362.

33 Orange-buff; pink slip, orange-brown paint. FM 78, ripple.

LH II A

There is much pottery belonging to this phase at Phylakopi. It is all imported. It was originally thought that an amount of this pottery was LM I B. This idea arose from Furumark's analysis of the pottery which led him to the conclusion that LH II A and LM I B were perhaps present in equal proportions (Furumark 1950, 198–9). However, these conclusions were based on publications rather than on handling the pottery. Most of the LB II imported material at Phylakopi generally has buff clay with a buff or, sometimes, pale yellow slip and black paint, often crackled; this is typical fabric of several areas of the mainland.

LH II A has been divided by Dickinson into a domestic class, consisting of shapes from the LH I repertoire which continued, and a palatial class, comprising adaptations and imitations of Minoan shapes (Dickinson 1972, 106, 108). The palatial class differs from Minoan vases in the use and arrangement of motifs. More recently I have isolated a third class which consists of exact copies of LM I B vases made on the mainland, which I have called the pseudo-Minoan class (see Mountjoy 1999*a*, 21–2 for a full description). These vases, which include examples in the Marine Style and the Alternating Style, used to be considered as Minoan imports, but chemical analysis of some of them has shown that they are of mainland manufacture (for analyses of such vases from the Argolid and Thessaly see Mountjoy 1999*a*, 21 with references. See now also Marketou *et al.* 2006, especially 34, fig. 4, 36–7, figs. 6–7, for analysis by NAA of a number of LM I B/LH II A sherds from Trianda, including Marine Style and Alternating Style, most of which matched the Argolid clay profile). At Phylakopi clay analysis has been carried out by OES on eight pieces of Marine Style from the recent excavations (Mountjoy *et al.*1978, nos. 41–8, 143–71) and by ICP on a further 28 sherds from the 1896–9 excavations (Mountjoy and Ponting 2000, *passim*); the latter date from LH I–III A1, but include 22 LH II A/LM I B. The analyses assigned all the sherds to a mainland provenance; none matched the Knossos profile (Mountjoy *et al.* 1978, 163; Mountjoy and Ponting 2000, 172). This included sherds from vessels that were Minoan shapes or decorated with exact copies of Minoan motifs and syntax. These vases belong to the pseudo-Minoan class. The fact that much of the pottery is LH II A, not LM I B, suggests that the Minoan thalassocracy, if it existed, did not continue into LM I B but ended in LM I A, probably as the result of the loss of the emporium of Akrotiri in the Thera eruption, which would have greatly affected Minoan trade (see Mountjoy and Ponting 2000, *passim*, Mountjoy 2004*b*, 399–404).

The five vases from the LM I B/LH II A destruction isolated by Barber (1974, 14–16) comprise an askos (now missing, Dawkins and Droop 1911, 15, fig. 2 centre), a squat jug **42**, a bridge spouted jug **44**, a piriform jar/alabastron **39** and a rounded alabastron **40** (for an

illustration of these vases together with some of the local vases found with them see Mountjoy in press). Barber has assigned the askos and the jug **42** to LH II A and the other vessels to LM I B (1974, 46–7). However, the piriform jar/alabastron is a mainland shape not usual on Crete. The two Marine Style vases **40**, **44** are probably also of mainland manufacture and belong to the pseudo-Minoan class. The destruction is important as the vases caught in it show that the full Marine Style was circulating together with the open ground Marine Style and the Alternating Style, both of which were thought to be a later development (see Mountjoy in press).

There is a range of LH II A shapes present in the 1911 excavations, but almost no whole pots, apart from those caught in the LM I B/LH II A destruction. Closed shapes include the large jar, piriform jar, rounded alabastron, the squat, bridge-spouted and beaked jugs and the stirrup jar. There is also a rare example of the piriform jar/alabastron. Open shapes include the rounded and bell cups. Surprisingly there are no straight-sided alabastra FS 91 and no shallow cups FS 218. The decoration comprises the usual wide range of motifs. Marine Style and Alternating Style are present, as well as plant motifs, ogival canopy, and pendants on vessels of the palatial class and the pseudo-Minoan class. The domestic class has double-axe, hatched loop, spirals and scale pattern amongst other motifs (for an overview of LH II A pottery from all three sets of excavations see Mountjoy 2007, 326–33).

Jar FS 15, 24 (FIG. 4)

Four sherds can be assigned to this shape, the so-called Palace Style Jar, to judge from their very thick sections. The large papyri **34** are similar to those on a vase from Thorikos (Mountjoy 1986, fig. 13.1). **35** and, possibly, **36** are decorated in the Marine Style with weed, which would have provided a background to a larger main motif, such as an octopus or argonaut. **37** has the edge of pendant above a row of blobs, similar to those on **48** (see, for example, Kalogeropoulos 1998, pl. 17 *c–d* for a parallel).

34 Whitish with grits; black paint. FM 11, papyrus.
35 Buff with grits; black paint. FM 30, weed. Mountjoy1984, 181, fig. 10 Phyl. 23.
36 Grey with grits; buff slip, shaded-brown paint. ?FM 30, weed.
37 Grey fired buff; white slip, dark brown paint. FM 38, pendant.

Piriform jar FS 20, 21 (FIG. 4)

The less thick section of **38** suggests it belongs to a large piriform jar rather than to a large jar. It has the edge of a papyrus, perhaps similar to those on a piriform jar from Thebes Ismenion T.3.2 (Demakopoulou and Konsola 1981, fig. on p. 15).

38 Buff with dark grits; dark brown paint. FM 11, papyrus.

Piriform jar/alabastron (FIG. 4)

39 comes from the LM I B/LH II A destruction deposit. It is one of a small group of vases belonging to a hybrid shape with the short flaring neck of the alabastron, the shoulder handles of the alabastron or piriform jar and a truncated lower body with flat, raised base below piriform shoulders. This hybrid shape is not common, but is widely spread geographically; it is found in Messenia (Mountjoy 1999*a*, Messenia nos. 9–10), in the Argolid (Demakopoulou 1993, pl. 5. 12), in Boeotia (Keramopoullos 1917, 200, fig. 244. 1) and on Kea at Ay. Irini (Mountjoy 1999*a*, Kea nos. 11–12; Cummer and Schofield 1984, pls. 72. 1127,

FIG. 4. LH IIA: **34–37** jar, **38** piriform jar, **39** piriform jar/alabastron, **40–41** rounded alabastron, **42–43** squat jug.

84. 1544, 88. 1646). **39** depicts ogival canopy; there are parallels on two of the Kea vases (Cummer and Schofield 1984, pls. 84. 1544, 88. 1646). Other motifs used on this shape are curved stripes (Mountjoy 1999*a*, Messenia nos. 9–10, Kea no. 11; Cummer and Schofield 1984, pl. 72. 1127; Demakopoulou 1993, pl. 5.12,) and ivy (Mountjoy 1999*a*, Kea no. 12; Keramopoullos 1917, fig. 244. 1). **39** has rock pattern above each handle, but unusually the scale in the rock pattern has dot fill. Scale pattern with dot fill at this early stage is rare, but there are examples, such as that filling the body of a bird on a beaked jug from Grave Gamma in Grave Circle B (Mylonas 1973, pl. 45*b*).

39 Buff; black to brown paint. D. (base) 9.8, (max.) 27.7, H. (ex.) 19.8. FM 13, ogival canopy, FM 28, rock pattern with dot fill above handles. Inv. 114. Dawkins and Droop 1911, pl. 11. 163.

Alabastron, rounded FS 81, 83 (FIG. 4)

40 is the large FS 81 decorated in the full Marine Style with argonaut Type B (see Mountjoy 1974, 177–80 for a definition of Types A and B). The stripes across the base are found in this phase on the base of the rounded and straight-sided alabastron, but are less common than the wavy-spoked wheel decoration (Mountjoy 1999*a*, rounded: Messenia nos. 12–13, straight-sided: Argolid no. 37). **40** was caught in the LM I B/LH II A destruction deposit and is, indeed, partly burnt. **41** is the smaller FS 83; this shape often has hatched loop, as here (for example, Mountjoy 1999*a*, Argolid no. 33).

40 FS 81. Partly burnt. Pink-buff; black to red paint. D. (rim) 10.4, (max.) 19.2, H. 8.5–8. FM 22, argonaut. Inv. 137, MM 223. Dawkins and Droop 1911, pl. 11.137, Mountjoy 1984, pl. 15 *f* Phyl. 2.
41 FS 83. Buff; shaded-brown to black paint. FM 63, hatched loop.

Squat jug FS 87 (FIG. 4)

42–3 are typical examples with hatched loop, a characteristic motif on this shape in this phase (for example, Mountjoy 1999*a*, Argolid no. 35). **42** was found in the LM I B/LH II A destruction deposit.

42 Buff; pale yellow slip, black to brown paint. D. (rim) 5.4, (base) 5.3, (max.) 9.9, H. 7.8. FM 63, hatched loop. MM 225. Dawkins and Droop 1911, 15, fig. 2. 82, Mountjoy 1986, fig. 21.1; 1999*a*, Melos no. 16; 2007, fig. 8 .15. 333.
43 Buff; black to brown paint. D. (rim) 5.4. FM 63, hatched loop.

Bridge-spouted jug FS 103 (FIG. 5)

44 is a massive example. It belongs to the Arcade Group which comprises a group of jugs with arcades round the base, ornate decoration on the shoulder below the neck and isolated motifs set in an open field (see Mountjoy 1999*a*, 23 for the Arcade Group and Betancourt 2000, 295–8 for arcades on other Minoan vases). The isolated motifs on **44** combine Marine Style and Alternating Style, as groups of argonaut Type B alternate with spray and rockwork (for a definition of the Alternating Style see Coldstream and Huxley 1972, 302–3 and fig. 96). The heavy serpentine loop on the shoulder, the sponge pattern on the neck and the foliate band down the handle are typical of LM I B and the mainland pseudo-Minoan style (see Mountjoy 1999*a*, 21–2 for this style). The imitation metal rivet at the top of the handle also has sponge pattern on it. There is a good parallel to the decorative scheme on a vase from Kos (Morricone 1973, 335, fig. 324). **44** belongs to the group of vases in the LM I B/LH II A destruction deposit. Since publication (Mountjoy 1984, 205, fig. 22 Melos no. 83) **45** has a

FIG. 5. LH IIA: **44–46** bridge-spouted jug, **47** ewer, **48** jug with cutaway neck/beaked jug, **49** beaked jug/bridge-spouted jug, **50–53** stirrup jar.

new join which now shows it has the base of the body of an argonaut. A number of bridge-spouted jugs depict argonaut (ibid., pls. 17 *d–g*, 18 *a–c*), whereas the motif is less common on the stirrup jar (ibid., pl. 27 *a–c*), so it has seemed better to assign **45** to the former shape. **46** is a typical neck with a decorated rim and running spiral on the neck (see Mountjoy 1986, fig. 24. 1–2 for parallels).

44 Imitation rivet at top of handle. Buff; black to brown paint. D. (rim) 17.5, (base) 12.4, (max.) 40, H. 34.5. FM 22, argonaut alternating with FM 28, rock pattern with spray, FM 31, sponge pattern on neck, FM 53, serpentine loop on shoulder, FM 66, arcades round base. Inv. 140. Dawkins and Droop 1911, pl. 11.140; Mountjoy 1984, pl. 18 *a* Phyl. 17.

45 Buff; black to shaded-brown paint. FM 22 base of argonaut. Mountjoy 1984, 205, fig. 22 Phyl. 83.

46 Grey fired buff; black to brown paint. FM 46, running spiral on neck, dots on rim.

Ewer FS 117 (FIG. 5)

The plump body and, more particularly, the whirling motif suggest **47** may belong to a ewer, such as an example from Palaikastro (Bosanquet and Dawkins 1923, 46, fig. 35; see also Wace 1932, T. 518. 3 pl. 39). **47** has ivy leaves radiating from the whirling motif, which seems to be an early version of quirk FM 48. 1.

47 Greenish; fugitive lustrous black paint. FM 12, ivy.

Jug with cutaway neck FS 131/beaked jug FS 141 (FIG. 5)

I have described **48** as the cutaway-necked jug FS 131 (Mountjoy 1999*a*, 898; 2007, 330), but on its recent removal from the vitrina for drawing I found the neck is broken off just above the handle joint and not enough of the neck is extant to be sure if it is FS 131 or the tall beaked jug FS 141, since the tall piriform body of both shapes is very similar (Furumark 1950, 194 has described it as FS 141). The decoration of **48** is sloppy. It comprises two zones of pendants linked by dot festoons, the zones being separated by a row of blobs; there is tongue pattern on the neck and curved stripes across the trough-shaped handle.

48 Buff; red-brown to black paint. D. (base) 6.7, (max.) 16.5, H. (ex.) 22. FM 38, pendant, tongue pattern on neck. Inv. 108 Dawkins and Droop 1911, pl. 11. 18.

Beaked jug FS 143/bridge-spouted jug FS 103 (FIG. 5)

49 is decorated in the open style with a starfish, a rare motif outside Crete. There is one other example known to me from Phylakopi (Mountjoy 1984, 205, fig. 22 no. 73). The plump rounded body of **49** suggests it belongs to a bridge-spouted jug, such as **44**, or a beaked jug, such as an example from the 1896–9 excavations (ibid., pl. 79 *f*). Since both these shapes are present at Phylakopi and decorated in the open style, as **49**, it is more likely that **49** belongs to one of them; I have assigned **49** here to the beaked jug, but the ewer and the stirrup jar cannot be excluded. Furumark's earliest examples of FS 143 are LH II B (Furumark 1941 607 FS 143). An earlier example from the 1896–9 excavations definitely belongs to this shape, but Furumark has assigned it to LM I B rather than LH II A (Furumark 1950, 193). However, since chemical analysis has shown that vases of the pseudo-Minoan class were made on the mainland, the 1896–9 vase need not be LM I B.

49 Buff; deep buff slip, brown-orange paint. FM 26, starfish.

Stirrup jar FS 169 (FIG. 5)

50 and **51** both have stacked zigzag. There is also an example from the 1896–9 excavations with this motif (Mountjoy 2007, fig. 8. 16. 343). A parallel is provided by a complete example from Thebes (Demakopoulou and Konsola 1981, fig. on 12). **52–3** have scale pattern, a characteristic motif on this shape (Mountjoy 1986, fig. 28. 1).

50 Deep orange; buff slip, shaded-brown paint. FM 61, zigzag.
51 Buff fired deep orange; buff slip, red-brown paint. FM 61, zigzag.
52 Buff; brown paint. FM 70, scale pattern with fill.
53 Buff; black paint. FM 70, scale pattern.

Askos FS 195

A complete askos (Dawkins and Droop 1911, 15, fig. 2 centre) is unfortunately missing. It is a rare LH II A example. The decoration consists of tangent spirals with solid centre and with blobs flanking the tangents. Another example from Phylakopi was found in the 1896–9 excavations (Mountjoy 2007, fig. 8. 16. 344).

Closed shape (FIG. 6)

A number of pieces are decorated in the Marine Style **55–62**; where tentacles are present, the octopus and argonaut are Type B. Three further Marine Style sherds are now missing (Dawkins and Droop 1911, pl. 14. 10, 14, 15). **54** with ogival canopy might belong to a bridge-spouted jug, which often has this motif (for example Mountjoy 1986, fig. 24. 1). The small shield on **63** may have been set against an open ground, such as on a beaked jug from Ay. Stephanos (Mountjoy 1999*a*, Laconia 27). **64** has part of an unidentifiable decoration.

54 Buff; black paint. FM 13, ogival canopy.
55 Grey fired buff; whitish slip, black paint. FM 21, octopus Type B. Mountjoy 1984, 204, fig. 21 Phyl. 48.
56 Grey fired buff; black paint. FM 21, octopus Type B. Mountjoy 1984, 204, fig. 21 Phyl. 52.
57 Pink-buff; red-brown to black paint. FM 21, octopus Type B. Mountjoy 1984, 204, fig. 21 Phyl. 55.
58 Pink; buff to yellow slip, shaded-brown paint. FM 22, argonaut Type B. Mountjoy 1984, 205, fig. 22 Phyl. 63.
59 Buff; pale yellow slip, black to shaded-brown paint. FM 22, argonaut Type B. Mountjoy 1984, 205, fig. 22 Phyl. 66.
60 Buff; white slip, black paint. FM 22, argonaut Type B. Mountjoy 1984, 205, fig. 22 Phyl. 67.
61 Buff; white slip, fugitive black paint. FM 22, argonaut Type B. Mountjoy 1984, 205, fig. 22 Phyl. 68.
62 Buff; pale yellow slip, shaded-brown paint. FM 22, argonaut. Mountjoy 1984, 205, fig. 22 Phyl. 69.
63 Buff; shaded-brown paint. FM 37, shield.
64 Burnt; black to mauve paint; edge of motif.

Cup, deep semi-globular FS 211 (FIG. 6)

Examples of both the tall type with splaying base and the low type with raised base are present. **66** belongs to the tall type which usually has double-axes, as here. The vase is illustrated Mountjoy 1986, fig. 31. 1, but I have now found the missing handle shown in the original photograph (Dawkins and Droop 1911, 15, fig. 2. 19) and more of the body in the sherd material. The handle is of metallic type with long diagonal leaves down it, as the Vapheio cup **27**. A rim from a similar cup, also with double-axe, is now lost (Dawkins and Droop 1911, pl. 14. 8). **65**, which is the low type, has parallels to the decoration of rim and body from Ay. Irini (Cummer and Schofield 1984, pl. 48. 181). The low maximum diameter of **67–8** assigns them

FIG. 6. LH IIA: **54–64** closed shape, **65–68** cup, **69–73** bell cup, **74** deep cup

to the low type. **65, 67–8** have a monochrome interior and belong to the pseudo-Minoan class.

65 Pink; buff slip, orange-brown paint. D. (rim) 8. FM 33, tricurved rockwork with handle ring on left, monochrome interior.

66 Buff; pale yellow slip, black to orange paint. D. (rim) 10.5, (base) 4.4, H. 9.6. FM 35, double-axe. Dawkins and Droop 1911 15, fig. 2.19; Mountjoy 1986, fig. 31.1; 1999*a*, Melos no. 30; 2007, fig. 8. 17. 347.

67 Buff; white-buff slip, black to brown paint. FM 53, wavy line, monochrome interior.
68 Orange; deep buff slip, orange paint. FM 76, stone pattern, monochrome interior.

Bell cup FS 221 (FIG. 6)

69 may be decorated in the Alternating Style, as the rock pattern motif is often used on this shape in this style (see Mountjoy 1985, fig. 8. 17. 356–7); the edge of the handle ring can be seen on the right of the sherd. **70** has quirk in zonal decoration, another popular syntax (see Mountjoy 1985, fig. 8. 17. 355 with zones of ivy and 358 with zones of spiral). Surface motifs, such as scale (**71–3**), are popular (for parallels see Caskey 1972, pl. 95 H17; Mountjoy 2003, fig. 4. 24. 396). The scale on **71–3** is inverted, as also on the parallels cited; that on **71** has blob fill. All the examples have a monochrome interior. As already noted (Mountjoy 2007, 332, there no. 359), the paint and fabric of **71** suggest a Mycenaean provenance, not a Minoan one. **69–70**, **72–3** could be LH II A or LM I B, but probably belong to the pseudo-Minoan class, similarly to an example from the 1896–9 excavations, which ICP has assigned to the mainland (Mountjoy and Ponting 2000, 172, Melos Sample no. 21).

69 Buff; red-brown paint. D. (rim) 8. FM 33, tricurved rockwork by handle ring, monochrome interior.
70 Pink; pink-buff slip, red-brown to black paint. D. (rim) 8. FM 48, quirk, monochrome interior.
71 Buff fired pink-buff; whitish slip, black paint. D. (rim) 8, (base) 3, H.6.2. FM 70, scale pattern with dot fill, monochrome interior. MM 407. Mountjoy 1986, fig. 33.1; 1999*a*, Melos no. 36; 2007, fig. 8. 17. 359.
72 Grey fired pink; buff slip, orange-brown paint. D. (rim) 8. FM 70, scale pattern, monochrome interior.
73 Pinkish; buff slip, red to black paint. D. (rim) 7. FM 70, scale pattern, monochrome interior.

Deep cup (FIG. 6)

There is a complete example from Ay. Irini (Cummer and Schofield 1984, pl. 49. 179) which is almost a twin to **74**. It gives an idea of the shape and motif. The rounded base of the Kea vase is pierced. The motif consists of four concentric wavy semicircles each side of the vase. Other examples of the shape also come from Ay. Irini. They are decorated in the Marine Style (Mountjoy 1999*a*, Kea no. 38) and the Alternating Style (Cummer and Schofield 1984, pl. 77. 1221; pl. 77. 1222 may, too, belong to this shape and be decorated in the Alternating Style). The top half of a vessel from the 1896–9 excavations also belongs to this shape (Mountjoy 2007, fig. 8. 17. 369). I have suggested that these vessels may be imported from south Laconia (Mountjoy 1999*a*, 900). The shape also appears in the Cycladic repertoire. An example from Phylakopi imitates LM I decoration; the base is pierced (Dawkins and Droop 1911, pl. X.141, Mountjoy in press for drawing).

74 Buff; black paint. D. (rim) 17. Concentric wavy semicircles with handle ring on right of sherd.

LH II B

Only a small amount of pottery of this date was found in all three excavations. It is all imported. That from the 1911 excavations consists only of beaked jug and goblet sherds. The latter include the Ephyraean goblet, with a main motif set against an open ground, and the goblet with rock pattern pendent from the rim, both characteristic of this phase. The beaked jug sherds are also decorated in the Ephyraean open style (see Mountjoy 2007, 333–5 for an overview).

Beaked jug FS143 (FIG. 7)

The large size and open background of **75–7** assign them to this shape which generally has a motif set against an open ground in the Ephyraean fashion in this phase. **75** has lily stamens, **76** a papyrus stem, and **77** argonaut.

75 Grey fired pale salmon; whitish slip, shaded-brown paint. FM 9, lily.
76 Grey fired buff; orange-brown paint. FM 11, papyrus.
77 Buff; orange-brown paint. FM 22, argonaut.

Beaked jug FS 149 (FIG. 7)

78 with a ridge at the base of the neck might be FS 149, the small beaked jug, but the earliest example in Furumark is LH III A1 (Furumark 1941, 607–8). The shoulder is too curving for the piriform jar, another possibility. The spiral is the LH II B hooked type FM 46. 33 (Furumark 1941, 354 and 353, fig. 59).

78 Orange; deep yellow-buff slip, dark brown paint. FM 46, running spiral.

Goblet FS 254 (FIG. 7)

The Ephyraean type with a single central motif each side in an open field and no rim banding is represented by **83** decorated with argonaut; **82** with octopus may also belong to this type (for a Minoan version see Popham *et al.*, pl. 54 *a–b*). **79–80** have the floral motifs popular in this phase, **79** with lily and **80** papyrus with blobs in the corners. The very short rim suggests a LH II B date for **80** rather than LH III A1, but a LH III A1 date cannot be ruled out. **81** with rock pattern pendent from the rim is characteristic of this phase; there is often a wavy band below the rock pattern (Mountjoy 1986, fig. 53. 4).

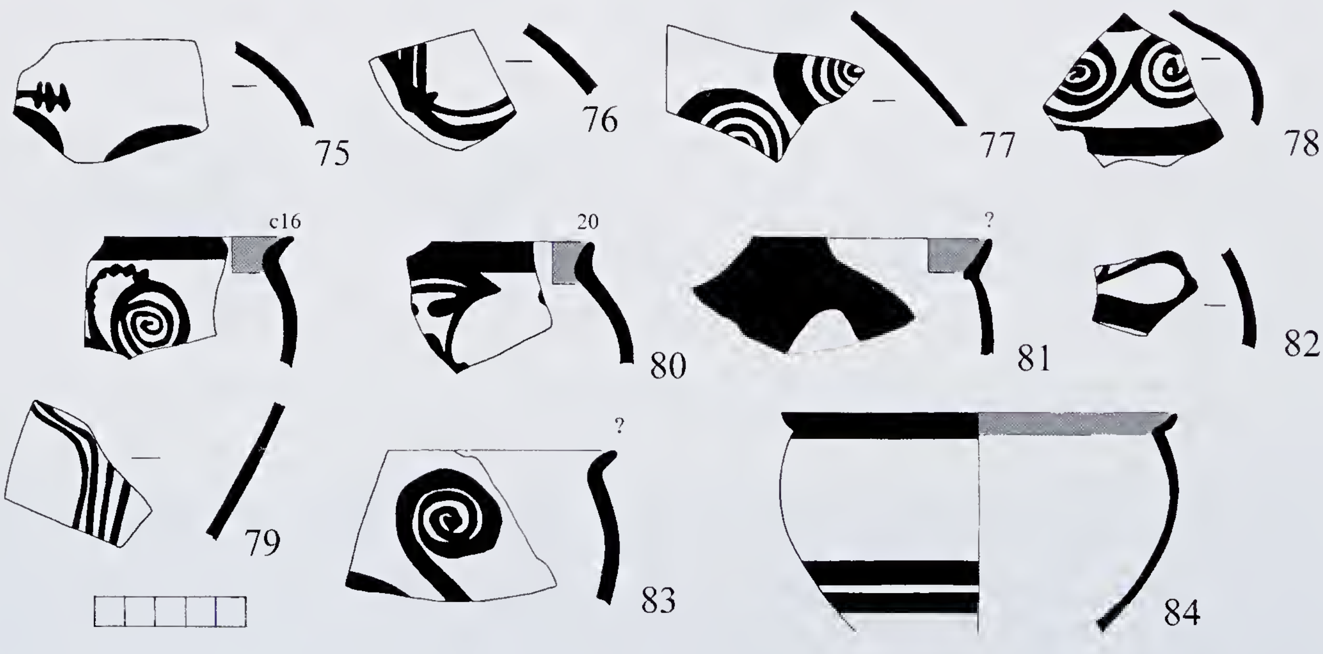

FIG. 7. LH IIB: **75–78** beaked jug, **79–84** goblet.

79 Buff; pale yellow slip, chocolate paint. D. (rim) c16. FM 9, lily. Mountjoy 1999*a*, Melos no. 49; 2007, fig. 8. 18.375.
80 Buff fired pinkish; yellow slip, brown paint. D. (rim) 20. FM 11, papyrus. Mountjoy 1999*a*, Melos no. 50; 2007, fig. 8. 18. 376.
81 Deep buff; pale yellow slip, red-brown paint. FM 32, rock pattern.
82 ?Ephyraean. Buff; orange-brown paint. FM 21, octopus.
83 Ephyraean. Buff fired pinkish; buff slip, orange-brown paint. FM 22, argonaut. Mountjoy 1999*a*, Melos no. 47; 2007, fig. 8. 18.374.

Goblet FS 263 (FIG. 7)

84 is a rare linear example. Its small diameter (13 cm) might suggest a cup FS 213 similar to a monochrome vessel from the recent excavations (Mountjoy 1985, fig. 5. 2. 18), but the diameter of the cup is usually about 10 cm (Mountjoy 1999*a*, Boeotia no. 37). **84** seems to be close in shape to a linear example from Ay. Stephanos (Mountjoy 1999*a*, Laconia no. 50), which has a raised concave base and the conical lower body with almost no stem of FS 263.

84 Buff fired pinkish; buff slip, orange paint. D. (rim) 13. Linear.

LH III A1

There is a large corpus from the 1911 excavations. It is all imported. The goblet is by far the commonest shape followed by a much smaller number of shallow cups. Other open shapes are the mug and the krater. Some sherds can be assigned to the different types of piriform jar; there are also sherds from rounded and straight-sided alabastra, the beaked jug, and the small handleless jar FS 77. The usual LH III A1 motifs of stipple, scale, net, and spiral are all present; argonaut and plant motifs are less common. Most of the goblets are decorated with running or curve-stemmed spiral; the cups and mugs have stipple decoration, as also the handleless jar (for an overview see Mountjoy 2007, 335–8). One krater **108** might be decorated with figure of eight shields set in scale pattern, but not enough is extant to be sure. Another krater **106** joins a piece from Trench PLa of the recent excavations to give a very elaborate papyrus, PLa was adjacent to H4/14 and H4/16 suggesting the 1911 piece might have come from here (Brodie *et al.* 2008, 412, fig. 38. 3). There is also an instance of a rare locally made Mycenaean vessel in this phase, a goblet **126** with argonaut.

Piriform jar FS 19, 23, 31 (FIG. 8)

Three piriform jar shapes seem to be represented, but most sherds seem to belong to the medium sized FS 23. The large **85** with argonaut can be assigned to FS 19 and the small-sized **92–6** to FS 31. The usual LH III A1 motifs are present; plant patterns include papyrus **86–7** and ivy **93**. The papyrus **86** has the typical blob fill in the corners and the ivy **93** has the usual multiple stem. The multiple stem **88** could belong to papyrus, lily or ivy, but as ivy is the commonest motif, it is probably the one depicted here. **87** might show a horizontally set papyrus with border fill of rock pattern, but the identification is not certain. Surface motifs include scale pattern **92**, **96** and net pattern **91**, **95**; cursive motifs are represented by the curve-stemmed spiral **94**. **90** may have a variant of double-axe, such as FM 35. 19, although it is not very close. **96** has the broad band flanked by a narrow band which is typical of this phase.

85 FS 19. Grey fired deep pink; buff slip, matt orange paint. FM 22, argonaut. Mountjoy 2007, pl. 37*g*. 379.
86 FS 23. Buff fired salmon; buff slip, orange-brown paint. FM 11, papyrus.

FIG. 8. LH IIIA1: **85–96** piriform jar, **97** small handleless jar, **98–99** rounded alabastron, **100** straight-sided alabastron, **101–05** beaked jug.

87 FS 23. Salmon; buff slip, brown-orange paint. ?FM 11, papyrus.
88 FS 23. Buff fired salmon; pale yellow slip, brown-orange paint. ?FM 12, ivy.
89 FS 23. Buff fired salmon; buff slip, red-brown paint. FM 22, argonaut.
90 FS 23. Grey fired deep salmon; buff slip, brown paint. ?FM 35. 19, double-axe.
91 FS 23. Buff; deep buff slip, dark brown paint. FM 57, net pattern.
92 FS 31. Buff fired pinkish; pale yellow slip, orange-brown paint. D. (base) 8.5, H. (ex.) 14.7. FM 70, scale pattern. Inv. 197.Mountjoy 1999*a*, Melos no. 54; 2007, fig. 8. 18. 378.
93 FS 31. Deep salmon; buff slip, shaded-brown paint. FM 12, ivy with edge of handle ring on right.
94 FS 31. Buff; black to brown paint. FM 49, curve-stemmed spiral.
95 FS 31. Buff; shaded-brown paint. FM 57, net pattern.
96 FS 31. Buff fired salmon; buff slip, red-brown paint. FM 70, scale pattern.

Small handleless jar FS 77 (FIG. 8)

97 is the only sherd from the 1911 excavations which can be assigned to FS 77; it has the characteristic stipple pattern found on this shape (Mountjoy 1986, fig. 63).

97 Salmon; buff slip, shaded-brown paint. FM 77, stipple.

Alabastron, rounded FS 84 (FIG. 8)

The very curving body of **98** suggests it belongs to FS 84. It is decorated with curve-stemmed ivy; part of the ivy leaf can be seen on the right side. **99** has the rock pattern usually found on this shape, but oddly has a fringed band above the rock pattern and an additional fringe round the base of the neck.

98 Pinkish; buff slip, dark brown paint. FM 12, ivy.
99 Deep pink-buff; buff slip, matt orange-brown paint. D. (max.) 12.2. FM 32, rock pattern with fringed band above.

Alabastron, straight-sided FS 93 (FIG. 8)

100 has the typical LH III A1 net pattern with a wide mesh and the typical LH III A1 body banding of a broad band flanked by a narrow one.

100 Greenish; fugitive shaded-brown to black paint. FM 57, net pattern.

Beaked jug FS 144 (FIG. 8)

101 is difficult to assign. It may be a papyrus derivative with the bloom reduced to a wavy filling motif floating between the calyx. Examples from Crete give a general idea of how the lower part of the motif might have looked, but they are not very close (Niemeier 1985, fig. 14). There is much variety in the rendering of the motifs on this shape (see Mountjoy 1999*a*, Messenia no. 39 for an argonaut with embellishments). The thick sections of **102–3** should belong to a large shape; the motif of group spiral and the open ground of **103** suggest the beaked jug.

101 Orange; orange paint. Silver mica. ?FM 11, papyrus.
102 Deep buff fired deep salmon; buff slip, brown-orange paint. FM 47, group spiral.
103 Buff fired deep salmon; pale yellow slip, orange-brown paint. FM 47, group spiral.

Jug FS 149 (FIG. 8)

104–5 could belong to this small jug; **104** has a neck ridge. **105** may be Minoan, but the sherd is too fragmentary to make a certain identification.

104 Orange-buff; orange paint. FM 46, running spiral with fill.
105 Orange-buff; buff slip, matt red-brown paint. FM 46, untidy running spiral.

Krater FS 7 (FIG. 9)

106 is from the same vase as a sherd from the recent excavations (Mountjoy 2007, fig. 8. 7. 126). **106** seems to join to the lower right side of the recent piece giving three rows of vertical foliate band at the top of the papyrus bloom, which is flanked by a barred calyx.[3] The 1974–7 piece comes from PLa, a trench by the Fortification Wall adjacent to H4/14 and H4/16 of the 1911 excavations (see plans Mountjoy 2007, 65, fig. 3. 41, Brodie *et al.* 2008, 410–12, figs. 38. 1–3). **106** has a ridge across it, which is shown in the section. The elaborate papyrus is unusual and the motif itself is not common on kraters. **107** has the ivy with multiple stem typical of this phase. **108** probably has a handle band on the right, but it is very wide; alternatively, it is just possible that a monochrome shield is depicted in scale pattern, similar to shields with stipple fill on kraters from Naxos (Kosmopoulos 2004, 141 wrongly dated to III A2–B, fig. 34. 65–112*b*, 222*a*), Enkomi (Karageorghis 1963, pl. 16.4, in net not scale) and Kalavasos (South 1999, pls. clxxvii 1807 *b*, clxxviii *b*). There is a similar shield from Phylakopi on a LH II B beaked jug from the 1896–9 excavations (Mountjoy 2007, fig. 8. 18. 370). As noted (ibid. 336 referring to fig. 8. 19. 380), the small size of the scale might suggest a LH III A2 date for **108**, but the very long everted rim is more common in LH III A1. **108** has a mend hole in the scale pattern (it is the circular hole in the second row of scale from the bottom of the sherd). There is one handle with diagonal bars across, which should also date to this phase.

106 Grey fired greenish; pale yellow slip, fugitive shaded-brown paint. D. (rim) 30. FM 11, papyrus. Joins 1974–7 Mountjoy 2007, fig. 8. 7. 126.
107 Buff fired pinkish; pale yellow slip, orange-brown to black paint. FM 12, ivy.
108 Mend hole. Buff fired pinkish; pale yellow slip, black paint. D. (rim) 30+. FM 37, shield with fill of FM 70, scale pattern. Mountjoy 2007, fig. 8. 19. 380.

Cup, shallow FS 219 (FIG. 9)

The shape has a shallow bowl with everted rim and raised concave base; the latter may have a groove round it on the interior, as **110**. Some examples have curve-stemmed spiral, **109–10** and five similar rims, but most are decorated with stipple, **111–15** together with seven body sherds and two more rims.

109 Buff; black to brown paint. D. (rim) 14. FM 49, curve-stemmed spiral.
110 Buff; pale yellow slip, orange-brown paint. D. (base) 3.4. FM 49, curve-stemmed spiral. Mountjoy 1999*a*, fig. 367 Melos no. 65; 2007, fig. 8. 19. 381.
111 Pink; deep buff slip, orange-brown paint. D. (rim) 11. FM 77, stipple.
112 Pinkish-buff; buff slip, orange-brown paint. D. (rim) 14. FM 77, stipple.
113 Grey fired buff; brown paint. D. (base) 4.2. FM 77, stipple.
114 Grey fired buff; red-brown paint. D. (base) 3.1. FM 77, stipple, edge of handle ring on left.
115 Grey fired pink; orange paint. D. (base) 3. FM 77, stipple.

[3] The join is reconstructed on paper since it was noted after work in the museum storeroom was finished.

FIG. 9. LH IIIA1: **106–08** krater, **109–15** cup, **116–21** mug, **122–28** goblet.

Mug FS 225 (FIG. 9)

A number of sherds belong to this cylindrical shape. A ridge is present at the waist, **117** and **120**, but not at the rim **118–19** and base **116–17**. Apart from **116** with spiral and **117** with net, all the examples have stipple, including two body sherds with ridged waist (Mountjoy 2007, pl. 38 *a*. 390–1). **116–17**, **121** have the characteristic concentric circles on the underside of the base (see Mountjoy 1986, fig. 73 for the shape).

116 Buff; orange-brown paint. D. (base) 11. Spiral.
117 Grey fired buff; yellow slip, brown paint. FM 57, net., Mountjoy 1986, fig. 73. 8; 1999*a*, Melos no. 68; 2007, fig. 8. 19. 387.
118 Pinkish; orange paint. D. (rim) 18. FM 77, stipple. Mountjoy 2007, pl. 38 *a*. 392.
119 Pink-buff; buff slip, shaded-brown paint. D. (rim) 17. FM 77, stipple. Mountjoy 2007, pl. 38 *a*. 393.
120 Buff fired pink; deep buff slip, orange paint. FM 77, stipple. Mountjoy 2007, pl. 38 *a*. 388.
121 Buff fired pink; deep buff slip, orange paint. D. (base) 15. FM 77, stipple. Mountjoy 2007, pl. 38 *a*. 389.

Goblet FS 255 (FIGS. 9–10)

There are a very large number of sherds belonging to this shape, most of which have spiraliform decoration. In addition to the pieces illustrated here there are four rims and 16 body sherds with spiral, and two rims and one body sherd with curve-stemmed spiral. **122–4** have typical plant motifs; **122** seems to have lily stamens, **123** the edge of ivy and **124** multiple stems, which probably belong to ivy, as this is the commonest plant motif, but might belong to the lily; the decorative zone has a border of rock pattern. **125** has groups of multiple stem. **126–7** have argonaut. **126** is odd; it has argonaut tentacles, but the argonaut body is either reduced (on the left) or non-existent; the group of narrow lines at the top of the stem is also unusual. **126** could be a cup, as it has a small diameter (14 cm), but the lower body is rather conical for this shape. The whitish slip and black paint look local. There is also an odd carination just below the rim. **128** has the type of rock pattern with crest which is generally found on alabastra; it would be interesting to know if the rest of the field on this large goblet was left empty. **129–34** have running spiral. **129** with small diameter (12 cm) might be a cup, but the bowl is not that of the shallow FS 219. **133** has a hook at the joint of each spiral, so they are not actually linked. **135–9** depict curve-stemmed spiral; **139** seems to have a triglyph by the spiral; this is an unusual feature in this phase, but the fabric, slip and paint of **139** correspond to LH III A1. **140** has serpentine loop with dot fill, a rather unusual motif on a goblet. **141** has wavy band and **142** groups of vertical wavy lines, another unusual motif. **143–6** have surface motifs consisting of net, scale and stipple. **147** depicts the loop of a handle ring which would extend below the belly bands. Two further handles and one body sherd with a handle loop are not illustrated, as well as eight linear body sherds.

122 Buff; black to shaded-brown paint. ?FM 9, lily.
123 Buff fired salmon; pale yellow slip, red-orange paint. FM 12, ivy.
124 Deep salmon; buff slip, orange-brown paint. ?FM 12, ivy with FM 32, rock pattern.
125 Grey fired pink-buff; pale yellow slip, orange-brown to black paint. D. (rim) 17. FM 19, multiple stem. Mountjoy 1999*a*, Melos no. 70; 2007, fig. 8. 19. 395.
126 Pinkish; buff slip, white on rim, orange-brown paint. D. (rim) 14. FM 22, argonaut.
127 Grey fired pink-buff; whitish slip, fugitive black paint. FM 22, argonaut.
128 Buff fired salmon; buff slip, orange to black paint. FM 32, rock pattern.
129 Greenish; black paint. D. (rim) 12. Spiral.
130 Buff; matt orange paint. FM 46, running spiral.

FIG. 10. LH IIIA1: **129–47** goblet.

131 Deep buff; white slip, black to red-brown paint. D. (rim) 17. FM 46, running spiral.
132 Grey fired buff; black to brown paint. D. (rim) 18. FM 46, running spiral.
133 Buff; orange-brown paint. FM 46, running spiral with hook at joints.
134 Buff fired deep salmon; pale yellow slip, orange-brown paint. FM 46, running spiral.
135 Grey fired pink-buff; red-brown paint. D. (rim) 19. FM 49, curve-stemmed spiral. Mountjoy 1999*a*, Melos no. 72; 2007, fig. 8. 19. 396.
136 Mend hole. Grey fired buff; orange-brown paint. FM 49, curve-stemmed spiral.
137 Greenish; fugitive shaded-brown paint. FM 49, curve-stemmed spiral.
138 Greenish; fugitive brown paint. FM 49, curve-stemmed spiral.
139 Buff fired salmon; yellow slip, black to brown paint. FM 49, curve-stemmed spiral with FM 75, triglyph.
140 Pink-orange; deep buff slip, red-brown paint. D. (rim) 17. FM 53, serpentine loop.
141 Pink; pale yellow slip, red-brown paint. FM 53, wavy band.
142 Buff; pale yellow slip, brown-orange paint. FM 53, vertical wavy line.
143 Buff fired salmon; buff slip, red-brown paint. FM 57, net.
144 Pinkish-buff with brown grits and inclusions giving speckle on interior; pale yellow slip, orange-brown paint. FM 70, scale pattern.
145 Buff; brown paint. FM 70, scale pattern.
146 Buff fired salmon; buff slip, orange paint. FM 77, stipple.
147 Buff; pale orange-buff slip, dark brown paint. Loop of handle ring.

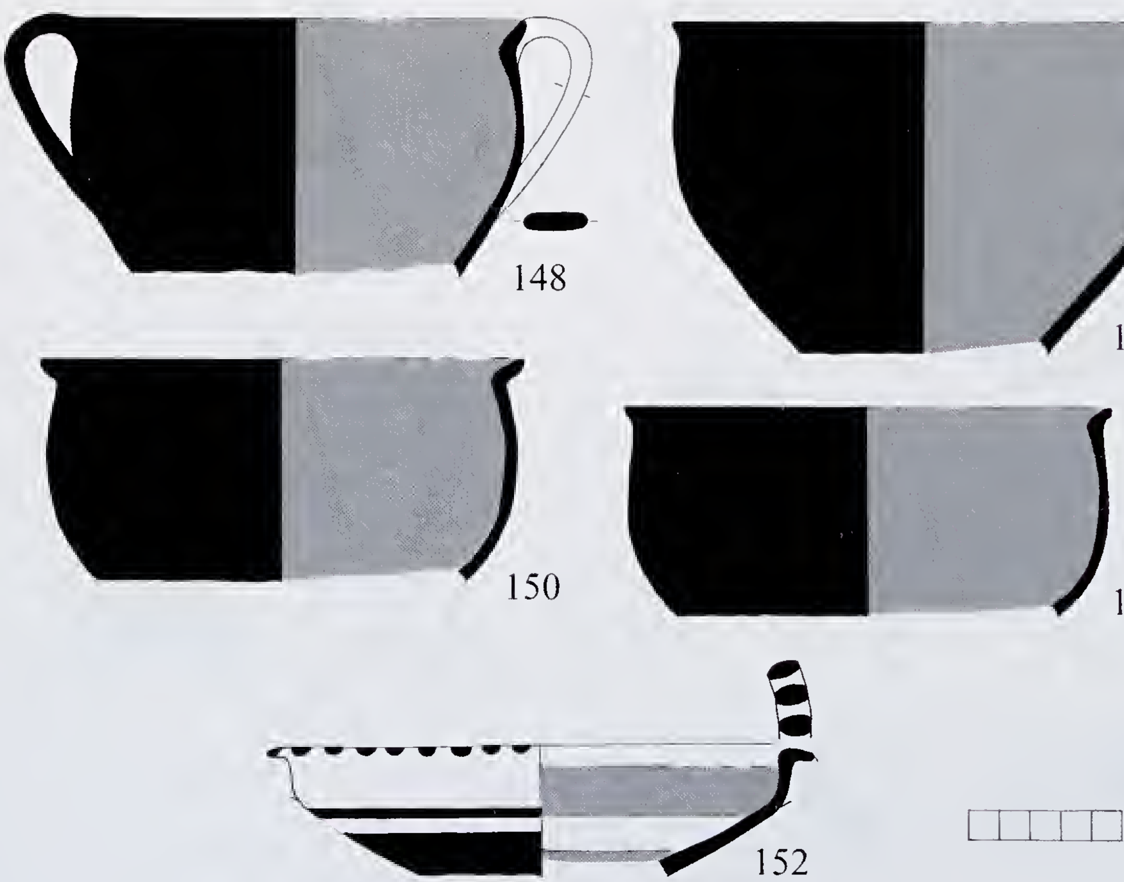

FIG. 11. LH IIIA1: **148–51** goblet, **152** shallow angular bowl.

Goblet FS 264 (FIG. 11)

The monochrome examples usually have orange paint **148–51**. The fairly long everted rim and deep rather narrow globular body assign them to this shape and phase rather than to the LH III A2 monochrome kylix or stemmed bowl, but the LH II B goblet cannot be ruled out.

148 Orange; orange paint. D. (rim) 15. Monochrome. MM 415. Mountjoy 2007, fig. 8. 19. 399.
149 Orange; orange paint. D. (rim) 16.6. Monochrome. MM 411.
150 Orange; orange paint. D. (rim) 16.6. Monochrome. MM 412.
151 Buff fired pinkish; orange paint. D. (rim) 16. Monochrome. MM 413.

Shallow angular bowl FS 295 (FIG. 11)

152 is a rare early example of a decorated shallow angular bowl. Its very long, turned-out rim suggests it dates to this phase, but it could be LH III A2. There is a parallel with similar long barred rim from Asine dated to LH II B–III A1 (Frizell 1980, fig. 8. 142); the white slip and orange paint suggest **152** may not be Argive.

152 Orange-buff; white slip, orange paint. D. (rim) 18. Linear, blobs across rim.

LH III A2

I previously suggested that there was very little LH III A2 pottery at Phylakopi (Mountjoy 2007, 338). However, the subsequent study of the material from the 1911 excavations has produced sherds belonging to almost 50 vessels. They are all imported. Surprisingly, only a couple of piriform jar sherds are present and there are not very many from stirrup jars, even though these are the standard shapes traded as containers for their contents. Other closed shapes present include the rounded and straight-sided alabastron and the conical rhyton. The fabric and distinctive slip of one straight-sided alabastron suggest it belongs to a group assigned by NAA to Euboea (Mountjoy and Mommsen 2006, 117). Open shapes are dominated by the kylix, but the krater, cup, spouted cup, and stemmed bowl are all attested. Two pieces of particular interest come from kraters. One is a rare example in the Cyclades of an amphoroid krater; it seems to depict a bird. The second sherd is from a stemmed krater, which also has pictorial decoration with a bird. Otherwise the usual motifs are present, i.e. flower, whorl-shell, multiple stem, foliate band and octopus; the latter is particularly popular on the kylix, generally with added white paint (for an overview of the LH III A2 pottery from all three excavation campaigns, see Mountjoy 2007, 338–41).

Piriform jar FS 39, 45 (FIG. 12)

Only two sherds could be assigned to this shape. **153** belongs to the large FS 39; it has chevron fill between running spirals (see Furumark 1941, fig. 60 FM 46. 42–6 for variants). **154** is a canonical version of the small FS 45 with vertical foliate band (see Mountjoy 1999*a*, Argolid nos. 143, 145 for parallels).

153 FS 39. Grey fired deep buff; red-brown paint. FM 46, running spiral with chevron fill.
154 FS 45. Buff fired salmon; yellow slip, orange-brown paint. FM 64, foliate band.

Amphoroid krater FS 53, 54 (FIG. 12)

155 is a rare example of this shape in the Cyclades. The distinctive band curving down from the neck round the handle can be seen on the right side of the sherd. It could be that a bird with

vestigial wing is represented, but the fringe on one side only is odd (see discussion in Mountjoy 2007, 338). However, a kylix from Ialysos has a bird with a fringed beak and also an extra funnel-shaped wing, as on **155**, as well as extra trailing plumes behind the wing (Vermeule and Karageorghis 1982, xii. 13), suggesting that the identification of **155** is correct.

155 Buff; black to brown paint. ?FM 7, bird by handle ring. Mountjoy 2007, pl. 38 *e*. 403.

Alabastron, rounded FS 85 (FIG. 12)

156 has the typical rock pattern found on this shape (Mountjoy 1986, fig. 85), but the decorative zone is unusually narrow.

156 Buff; black paint. FM 32, rock pattern.

Alabastron, straight-sided FS 94 (FIG. 12)

157–8 have the net pattern common on this shape. The net has a very small mesh, as the diagonals are set very close together. This version is found in LH III A1, but is more common on later vases. The narrow decorative zone of **157** suggests a LH III A2 late date. The fabric and distinctive lemon slip of **159** assign it to a group, which may be from Euboia, isolated by NAA at Troy (Mountjoy and Mommsen 2006, 16, 117 and fig. 15. 126). The slip extends down below the paint on the inside of the neck on **159**, as also on the LH III B Trojan example (Mountjoy and Mommsen 2006, 16, 117, fig. 15. 126).

157 Buff; black to shaded-brown paint. D. (max.) 13. FM 57, net pattern. MM 394.
158 Buff; orange paint. FM 57, net pattern.
159 Rust with grits; lemon yellow slip, lustrous dark brown paint. A little silver mica. D. (rim) 7. FM 64, foliate band. 295/275 or 293/273.

?Hydria FS 129 (FIG. 12)

160 may belong to this small LH III A2 version of the hydria, which often has a pierced base (see Mountjoy 1999*a*, Argolid nos. 168–71 for comparanda). The section is too thick for the smaller FS 149.

160 Buff; fugitive shaded-brown paint. FM 18, flower.

Beaked jug FS 145 (FIG. 12)

The larger size of **161** suggests this shape. **161** seems to have the stamens of flowers, but the hooked version of multiple stem (FM 19. 49–50, 55–6) cannot be ruled out.

161 Buff; black paint. ?FM 18, flower.

Stirrup jar FS 166, 171 (FIG. 12)

There are only a few examples. **162–5** are FS 166, the large piriform type; **162** and **165** can be assigned from the large false mouth; **162** also has the ridge at the base of the false neck found on this shape (Mountjoy 1986, fig. 91); **163–4** are assigned from their large size and **163** also on the decorated belly zone, which is too narrow for that of a piriform jar; it depicts the LH III A2 flower with fat calyx, FM 18. 59, 61. There are many body sherds belonging to **162**, but it could not be restored, as the interior of the sherds is worn away so that most are only 2 mm thick. **166–8** are FS 171 with globular body. The false mouth **168** has the solid centre circle found in LH III A2 (Mountjoy 1986, fig. 93. 2–3); it also has a hollow neck. The

FIG. 12 LH IIIA2: **153–54** piriform jar, **155** amphoroid krater, **156** rounded alabastron, **157–59** straight-sided alabastron, **160** ?hydria, **161** beaked jug, **162–68** stirrup jar, **169** flask, **170–73** conical rhyton.

two spouts **166–7** have multiple stem and N pattern respectively. There is also one false mouth and one linear body sherd (not illustrated).

162 FS 166. Buff; shaded-brown paint. D. (false mouth) 3.8. FM 18, flower.

163 FS 166. Buff; fugitive orange-brown paint. FM 18, flower in belly zone.

164 FS 166. Grey fired buff; orange paint. FM 60, N pattern.

165 FS 166. Pinkish; buff slip, orange-brown paint. D. (false mouth) 3.8. Concentric circles on false mouth.
166 FS 171. Pinkish; buff slip, dark to light brown paint. D. (spout) 2.3. FM 19, multiple stem.
167 FS 171. Buff; chocolate paint. D. (spout) 2.3. FM 60, N pattern.
168 FS 171. Orange-buff; buff slip, orange-brown paint. D. (false mouth) 2.5. Solid disc on false mouth.

Flask FS 190 (FIG. 12)

169 is a small example of the horizontal type of flask. It has a tall version of quirk.

169 Buff; orange-brown paint. FM 48, quirk. Mountjoy 1986, fig. 96. 3; 1999*a*, Melos no. 80; 2007, fig. 8. 20. 405.

Rhyton, conical FS 199 (FIG. 12)

A few sherds belong to this shape. **170** has the LH III A2 flower with fat calyx, similar to that on the stirrup jar **163**. **171** has a zone of hooked chevrons and a zone of curtailed running spiral; the latter is an uncommon version with a double stem FM 46.17. **172** has an everted rim instead of the usual plump rounded rim (Mountjoy 1986, fig. 98. 1–3); there is a parallel from the Argolid (ibid., fig. 98. 4). **172** depicts wavy border, a smaller version of that on the krater **177**. **173** has the characteristic linear decoration of fine line groups flanked by broad bands found on this shape, as also **171** (ibid., fig. 98. 2–3).

170 Buff; shaded-brown paint. FM 18, flower. Mountjoy 1986, fig. 98. 7; 2007, fig. 8. 20. 406.
171 Pinkish-buff; pale yellow slip, orange paint. Zone of FM 58, chevrons with zone of FM 46.17, curtailed running spiral.
172 Buff; pale yellow slip, red-brown paint. D. (rim) 16. FM 65, wavy border. Mountjoy 1986, fig. 98.5; 1999*a*, Melos no. 81; 2007, fig. 8. 20. 408.
173 Grey fired deep buff; buff slip, brown-orange paint. Linear.

Krater FS 8 (FIG. 13)

174 is very worn but it seems to have a bird facing right with the tail on the left; the fringe on the end of the tail is partly preserved; the head would have to be bent down to fit into the zone. The filling motif of foliate band is often used in bird bodies (Mountjoy 1999*a*, LH III A1 Attica no. 108, LH III A2 Phocis no 63, also with fringed tail; Argolid Vermeule and Karageorghis 1982, viii.14). **175** has bivalve as a filling motif to the main decoration; **176** depicts curve-stemmed spiral; there is a krater sherd with similar decoration from the recent excavations at the site (Mountjoy 1985, fig. 5. 27. 491); **177** has a large version of wavy border; there is a parallel on a kylix from the 1896–9 excavations (Mountjoy 2007, fig. 8. 20. 416).

174 Orange-buff; buff slip, fugitive orange paint. FM 7, bird.
175 Buff; shaded-brown paint. FM 25, bivalve.
176 Grey fired deep buff; buff slip, semi-lustrous orange-brown paint. Silver mica. FM 49, curve-stemmed spiral.
177 Buff fired salmon; pale yellow slip, red to black paint. FM 65, wavy border.

Cup FS 220 (FIG. 13)

Narrow zonal motifs are often used on this shape, such as the looping version of N pattern **179**; there is a parallel from the recent excavations (Mountjoy 1985, fig. 5. 27. 495). The vertical band of paint on the left edge of **179** might be a handle ring, although the shape does not usually have this. **178** may have the stem of a curtailed running spiral, such as on examples from the Argolid (Mountjoy 1986, fig. 100. 4).

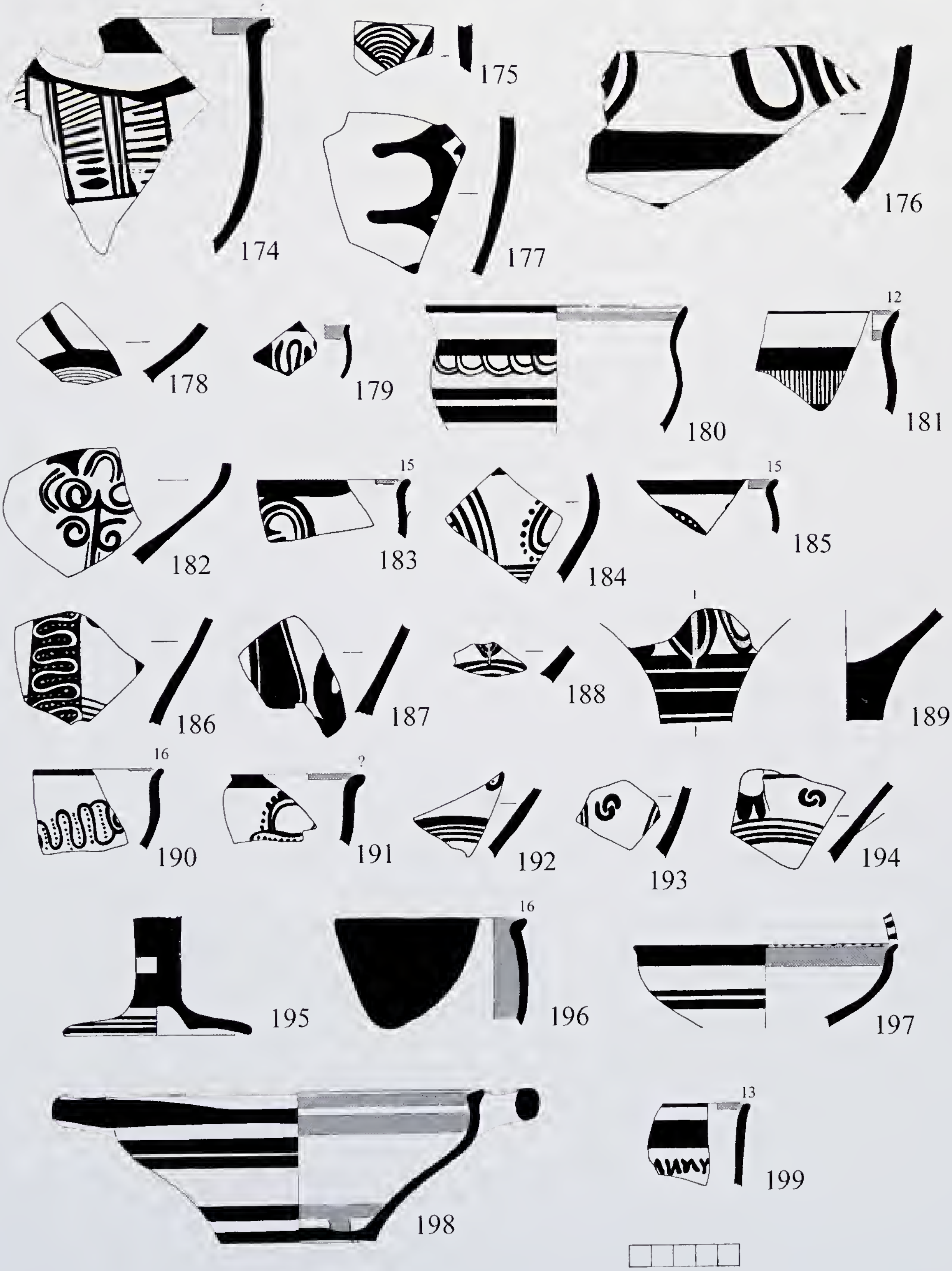

FIG. 13. LH IIIA2: **174–77** krater, **178–79** cup, **180–81** spouted cup, **182–96** kylix, **197–98** bowl, **199** stemmed bowl.

178 Buff; deep buff slip, black to shaded-brown paint. ?FM 46, curtailed running spiral.
179 Buff; shaded-brown paint. FM 60, N pattern.

Spouted cup FS 249 (FIG. 13)

180–1 have the typical deep flaring rim of this shape with a band on it and below it on the exterior and interior; the exterior band is set well below the rim giving rise to a narrow decorative zone, which usually has narrow zonal motifs.

180 Buff; black to orange paint. D. (rim) 11.8. FM 42, joining semicircles.
181 Buff; brown paint. D. (rim) 12. FM 64, foliate band.

Kylix FS 256, 257 (FIG. 13)

There are a number of examples. In most cases not enough of the sherd is preserved to allow assignation to FS 256, with decorative zone ending at the handle base, or FS 257, with decorative zone reaching to the belly. The vases decorated with octopus usually have the shape of FS 256 with large ear-like handles, but the octopus reaches to the top of the stem, as **189** and, probably, **186–8** (see Mountjoy 1986, 88–90 for the shapes). All the usual motifs are represented, such as flower **182**, multiple stem **183–4**, octopus with added white paint **185–9**, and whorl-shell **190–2**. **182** has a very elaborate flower. It is similar to one from Kastri (Mountjoy 1999*a*, Laconia no. 152) dated to LH III B (Furumark 1941, fig. 42 FM 18. 30). However, **182** is more elaborate; the outlined stem and solid filled blooms suggest a LH III A2 date. The multiple stem on **183** is antithetic with one pendent from the rim band meeting one rising from the belly band (see Mountjoy 1999*a*, Rhodes no. 61 for a complete example); **183** displays one rising from the belly band meeting the tip of one pendent from the rim. **184** may also have the hooked version of multiple stem, but the dot fringe is odd. The octopus is particularly popular **185–9** (see Mountjoy 1999*a*, Rhodes no. 62 for an elaborate example). The whorl-shell **190**, **192** is the horizontal LH III A2 type (Mountjoy 1986, fig. 107. 1, 6). **191** is the vertical LH III B type, but the pronounced lip of the sherd and the large head of the whorl-shell with dot fringe suggest a LH III A2 date; in LH III B the kylix usually has a lipless rim and the whorl head is smaller (Mountjoy 1986, fig. 141). The quirk **193–4** is used as a filling motif. The base **195** could be LH III A2 or LH III B.

182 FS 257. Pinkish-buff; yellow-buff slip, shaded-brown paint. FM 18, flower. MM 462.
183 Pinkish-buff; buff slip, red-brown paint. D. (rim) 15. FM 19, multiple stem, hooked.
184 FS 256. Pinkish-buff; orange-buff slip, orange paint. ?FM 19, multiple stem, hooked.
185 Buff; black paint with added white. D. (rim) 15. FM 21, octopus.
186 Deep buff; red-brown paint with added white. FM 21, octopus. MM 458.
187 Buff fired pinkish; orange paint with added white. FM 21, octopus.
188 Buff fired deep salmon; buff slip, orange paint with added white. FM 21, octopus.
189 Buff; orange-brown paint with added white. FM 21, octopus.
190 Buff fired orange; deep buff slip, orange-brown paint. D. (rim) 16. FM 23, whorl-shell.
191 Pinkish fired buff; shaded-brown paint. FM 23, whorl-shell. Mountjoy 1999*a*, Melos no. 93; 2007, fig. 8. 20. 414.
192 Buff; orange paint. FM 23, whorl-shell.
193 Pink-buff; orange paint. FM 48, quirk flanked by edges of main motif.
194 FS 256. Buff fired deep salmon; orange paint. FM 48, quirk.
195 Grey fired salmon; buff slip, orange-brown paint. Silver mica. D. (base) 8.6. Linear.

Kylix FS 264 (FIG. 13)

The monochrome **196** has the short knobbed LH III A2 rim rather than the longer rim of the LH III A1 goblet. It could belong to the monochrome kylix FS 264 or the monochrome stemmed bowl FS 304 (Mountjoy 1986, 91–2, fig. 112. 7–8), but the slight groove below the lip suggests the kylix (Mountjoy 1986, 190 and fig. 108).

196 Buff fired salmon; orange paint. D. (rim) 16. Monochrome.

Miscellaneous bowl (FIG. 13)

197 is difficult to date. There are no obvious parallels from the large array of LH III B–III C bowls at Tiryns (see Podzuweit 2007, pls. 38–41). Tiryns Type 2 is the closest (Podzuweit 2007, pl. 41.5), but Type 2 is described as having a flattened lip (Podzuweit 2007, 75), which **197** has not, so it has seemed best to date it to this phase. The everted rim suggests a date in this phase for **198**, as LH III B rims are usually lipless. It is akin to a shallow angular bowl FS 295, but it is not carinated and the wide raised base is not that of the LH III C linear shape; also the lustrous paint suggests an earlier date.

197 Pinkish; buff slip, orange paint. D. (rim) 12. Linear, blobs on rim.
198 Deep buff; black to brown paint. D. (rim) 16.8 (at handles 17), (base) 7, H. 6.4–8. Linear. Inv. 141.

Stemmed bowl FS 304 (FIG. 13)

199 has the straight upper body and knobbed rim of this shape. It has the narrow zonal pattern found in LH III A2.

199 Buff; pale yellow slip, orange-brown paint. D. (rim) 13. FM 60, N pattern. Mountjoy 1999*a*, Melos no. 99; 2007, fig. 8. 20. 417.

LH III B

LH III B pottery is not very common at Phylakopi, but the 1911 excavations add a few more pieces to the corpus. All are imported and have lustrous paint. The commonest closed shape is the stirrup jar, which is present in various types; amongst the open shapes the kylix and deep bowl are almost equally present. A small collar-necked jar FS 64 with pictorial decoration of birds and, possibly, sphinxes, is of particular interest. This shape is not common in LH III B (Mountjoy 1986, 125), but the clay and lustrous paint demonstrate that the piece is an import, so it is unlikely to date to LH III C, when the pottery at Phylakopi was locally made; moreover, the motifs have LH III B parallels. Another piece of interest is a sherd from a rare example of a fish-shaped rhyton to which there is a parallel from Tiryns (for an overview of the LH III B pottery from the site see Mountjoy 2007, 341–4).

Piriform jar FS 35, 37, 40 (FIG. 14)

The thick section suggests **200** belongs to the large type FS 35. It might depict a bird facing left with its beak in a flower; the head and eye of the bird can be seen on the left edge of the sherd above the bulging chest. **201** has vertical quirk in a panel; there is a good parallel to the decoration on a piriform jar from Vati (Mountjoy 1999*a*, Rhodes no. 123) assigned by Furumark to LH III C Early FS 37.11. However, since the LH III C pottery at Phylakopi is all locally made, it seems better to assign **201** to LH III B; indeed, the yellow slip actually suggests

FIG. 14. LH IIIB: **200–02** piriform jar, **203–04** collar-necked jar, **205–06** jug with cutaway neck, **207** beaked jug, **208–15** stirrup jar, **216** fish rhyton.

LH III A2. **202** with hooked multiple stem might be FS 40; there is a good parallel from Mycenae (Mountjoy 1986, fig. 115. 2).

200 ?FS 35. Buff; deep buff slip, black to brown paint. Silver mica. FM 18, flower with FM 7, bird.
201 FS 37. Buff fired salmon; pale yellow slip, orange-brown paint. FM 75, panelled with FM 48, quirk.
202 ?FS 40. Buff; shaded-brown paint. FM 19, multiple stem, hooked.

Collar-necked jar FS 63, 64 (FIG. 14)

The collar-necked jar was thought by Furumark to begin in LH III C (Furumark 1941, 594–5 FS 63–4), but there is a LH III B1 example from Mycenae (Mountjoy 1986, 125) and LH III B2 examples from excavations in Thebes (see Mountjoy 1999*a*, 642 for references). The lustrous paint suggests a date in this phase for **204**, rather than in LH III C, when the shape is more common. The birds on the neck might have vestigial wings, or the V-shaped motif is a tail and the birds are wingless. Pictorial decoration on the neck of this shape is very unusual. The birds on the shoulder have a line to the left of the neck following the curve of the neck; it may be that a second wing is represented. There is a parallel to the squashed net-filled bodies of the birds on the neck on a LH III B flask from Deiras (Vermeule and Karageorghis 1982, ix. 96); the Deiras birds are wingless. A series of LH III A2 stirrup jars FS 178 from Mycenae is decorated with birds and sphinxes (Sakellarakis 1992, 110–12, 144 nos. 245–8). The wings of the sphinxes are very similar to those of the birds on the body of **204**; it is just possible that sphinxes are represented here, as no bird head is actually extant, but **204** should not be dated to LH III A2, as the collar-necked jar would be a rarity in that phase. The lustrous paint and the decoration also suggest a LH III B date for **203**. It has a version of the LH III A2 curtailed running spiral with double stem (FM 46.18).

203 FS 63. Lug on shoulder. Pinkish-buff; buff slip, shaded-brown paint. Silver mica. FM 46, curtailed running spiral.
204 FS 64. Pink-buff; deep buff slip, black to brown paint. D. (rim) 22. FM 7, bird.

Jug with cutaway neck FS 136 (FIG. 14)

205 is published as FS 136 (Mountjoy 2007, 343), but it might be FS 120, which often has panelled pattern and which is more common than was previously apparent, as many examples from the recent excavations at Midea now demonstrate (Demakopoulou *et al.*1994, 29, figs. 25–6, 30, fig. 28; 2001, 42, figs. 12–13, 43, fig. 21); the edge of a possible stemmed spiral can be seen on the right of the sherd. **206** with flower in an open field is probably FS 136. There are parallels to a motif in an open field from the Argolid (Mountjoy 1999*a*, Argolid no. 245; Vermeule and Karageorghis 1982, ix. 27).

205 Pink; buff slip, chocolate brown paint. Much fine silver mica. FM 75, panelled with ?FM 51, stemmed spiral. Mountjoy 2007, pl. 38 *d*. 420.
206 Buff; orange-brown paint. Silver mica. FM 18, hybrid flower.

Beaked jug FS 146 (FIG. 14)

207 depicts the LH III C type of running spiral with open centre (Furumark 1941, fig. 60 FM 46. 58), but the fabric and lustrous paint demonstrate that the vessel is an import. There is no certain evidence so far for imported vessels to Phylakopi in LH III C, so it has seemed better to date this vase to LH III B.

207 Buff; brown-orange paint. FM 46, running spiral.

Stirrup jar FS 173, 180, 182 (FIG. 14)

208 with bivalve in the belly zone and **209** with quirk are the rounded FS 173. **208** has two narrow lines framed by broader bands on the shoulder instead of the usual fine line group. **210–11** are the very flat FS 180. **211** with V pattern in the belly zone is dated here from its chocolate-coloured paint, as brown paint is more frequent in LH III B compared with orange in LH III A2, but this is not a sound criterion; **211** could be LH III A2. There are also two linear body sherds belonging to this shape and four false mouths. **212–15** are the conical FS 182 with a rounded shoulder with an almost flat top. **212–13** have the flat top and **214–15** the rounded shoulder. **212** is a small version similar in size to one from Vourvatsi (Mountjoy 1986, fig. 131. 1), but **213–15** belong to the larger size (Mountjoy 1999*a*, Argolid no. 255). **212–13** have the usual shoulder motifs of multiple stem and flower respectively, **214** has joining semicircles in the belly zone and **215** has a version of quirk reduced to circles, as also the FS 180 **210**. There are two more shoulder sherds belonging to FS 182 decorated with flower.

208 FS 173. Buff; white-cream slip, fugitive orange-brown paint. FM 25, bivalve in belly zone.
209 FS 173. Buff; black to shaded-brown paint. FM 48, quirk in belly zone.
210 FS 180. Buff fired deep salmon; buff slip, brown-orange paint. D. (max.) 15.2. FM 48.15, quirk in belly zone.
211 FS 180. Buff; chocolate-brown paint. D. (max.) 13. FM 59, V pattern.
212 FS 182. Buff; orange-brown paint. Silver mica. D. (max.) 9.6. FM 19, multiple stem, curved.
213 FS 182. Grey fired buff; pale yellow slip, orange-brown paint. FM 18, flower.
214 FS 182. Buff; black paint. Silver mica. D. (max.) 15. FM 42, joining semicircles in belly zone.
215 FS 182. Buff; orange paint. FM 48.18, quirk in belly zone.

Rhyton, fish (FIG. 14)

216 is part of a wheelmade fish rhyton. An almost complete vessel from Tiryns gives an idea of the shape (see Guggisburg 1996, 53 no. 152 pl. 9. 8–9 and Koehl 2006, Type III Head-Shaped Fish 43 no. 369 pl. 30). **216** has dot-filled scale similar to that on the Tiryns vase; a comparison with the Tiryns vase suggests, from the small size of the scales, that **216** should come from near the mouth. The Tiryns vase is dated LH III A2–III B from context (Koehl 2006, 43).

216 Pink-buff; deep buff slip, brown paint. FM 70, scale pattern with dot fill.

Krater FS 9

A rim sherd from a krater decorated with antithetic whorl-shell is now missing (Dawkins and Droop 1911, pl. 14. 42).

Kylix FS 258 (FIG. 15)

The stem **217** is the Zygouries type, the hallmark of this phase, which has a single motif in the centre of one side (Mountjoy 1986, 113–14). **218** has flower and **220–1** vertical whorl-shell, both common motifs in this phase. The tip of the handle splash can be seen on the left edge of **221**. **219** is either part of a vase which has been restored on paper (Mountjoy 2007, fig. 8. 21. 427) from sherds in the National Museum, Athens (NM 12091) and the Ashmolean Museum, Oxford (Sherratt 2000, AE 2067a pl. 555. 594), or it comes from a similar vessel; the motif consists of a central panel filled with rows of horizontal wavy lines flanked by single hooked chevrons; above are three ovals filled with net pattern (see Furumark 1941, fig. 44 FM

FIG. 15. LH IIIB: **217–22** kylix, **223–30** deep bowl, **231** deep conical bowl, **232–33** stemmed bowl.

18. 52–53 for the ovals). There is a good parallel to the panel from Zygouries (Blegen 1928, pl. 18). It might be that **219** and Mountjoy 2007, 427 belong to Zygouries kylikes. **222** has lozenge filling motif.

217 Zygouries type. Buff; pink-buff slip, orange paint. Panel of FM 18, hybrid flower.
218 Buff; shaded-brown paint. D. (rim) 14. FM 18, flower. MM 461.
219 Buff; red-brown paint. FM 18. 52, 53, flower.
220 Buff; black to brown paint. FM 23, whorl-shell.
221 Buff; orange paint. FM 23, whorl-shell.
222 Pink-buff; buff slip, orange-brown paint. Silver mica. FM 73, lozenge.

Deep bowl FS 284 (FIG. 15)

The straight **225**, **227** or slightly flaring **223–4**, **226** upper body and the lustrous paint assign these sherds to this phase. **223** has a rather uncommon combination of whorl-shell and triglyph. **224** has a narrow zonal decoration consisting of a floating row of multiple arcs; this is a Minoan motif (Popham 1970*b*, 198, fig. 2 .9–10), but the profile of **224** is that of a Mycenaean deep bowl, not the broad straight-sided LM III B shape (ibid. 196, fig. 1.5, pl. 52). The fabric does not look Minoan. There is a somewhat similar deep bowl from the recent excavations (Mountjoy 1985, fig. 5. 8. 205), also with a Minoan motif, but the fine line group on the belly of both vases does not seem to be a Minoan characteristic (see Hallager and Hallager 2000, pls. 35–6 for LM III C examples). **225** depicts semicircles in panelled decoration; the centre of the semicircles is not extant; it may be that a group of very small semicircles was depicted in the centre, as on the LH III C version **280–81**. There are examples from Tiryns from a late LH III B context (Voigtländer 2003, pl. 43 HS 66, 68, pl. 63 Si 43–5, 47–8). **226–8** have antithetic spiral and **229–30** the popular panelled decoration. The antithetic spiral **227** is very untidy and has the open centre more usual in LH III C, but the lustrous paint suggests a LH III B date and that the piece is an import; the edge of the loop of the antithetic spiral can be seen at the top of the sherd. **223–4**, **227**, **229** have belly bands consisting of a fine line group instead of a single belly band. This banding is characteristic of LH III B1, as a comparison with material from Mycenae shows (Wardle 1969, 274, fig. 6. 44, 48–9; Mountjoy 1976, 88, fig. 6. 41–4, 89, fig. 7. 55, 58, 60–1).

223 Orange-pink fired buff; brown to black paint. D. (rim) 13. FM 23, whorl-shell with triglyph of FM 42, joining semicircles. MM 310.
224 Buff; shaded-brown paint. D. (rim) 15.8. Multiple arcs.
225 Deep orange; buff slip, orange-brown paint. FM 75, panelled with FM 43, semicircles.
226 Buff; shaded-brown paint. Silver mica. D. (rim) 15. FM 75, panelled with FM 50, antithetic spiral.
227 Buff; greenish slip, pale brown paint. FM 50, antithetic spiral.
228 Grey fired deep buff; brown paint. FM 75, panelled with FM 50, antithetic spiral.
229 Pinkish; buff slip, shaded-brown paint. FM 75, panelled pattern.
230 Orange; buff slip, orange-brown paint. Silver mica. FM 75, panelled pattern.

Deep conical bowl FS 300/301 (FIG. 15)

There is a lower half with linear decoration **231**; unusually the interior is banded from top to bottom. I have assigned **231** to FS 301 (Mountjoy 2007, 344 no. 433), but on reviewing it 20 years later I am less sure. The handle is broken off very close to the body, so it could be that the round-handled type FS 300 is represented rather than the strap-handled type FS 301.

231 Buff fired pink; pink-buff slip, orange-brown paint. D. (base) 9.2. Linear. MM 477. Mountjoy 1999*a*, Melos no. 119; 2007, fig. 8. 21.433.

Stemmed bowl FS 305 (FIG. 15)

232–3 have the typical thickened rim of this shape. Both have panelled decoration, **233** with the semicircles often found in panelled decoration. There is a parallel from the recent excavations with a rare example of smudging by the painter (Mountjoy 2007, fig. 8. 21. 211).

232 Orange fired buff; shaded-brown paint. D. (rim) 17.5. FM 75, panelled with FM 43, semicircles.
233 Buff fired deep salmon; buff slip, orange paint. D. (rim) 16. FM 75, panelled pattern.

LH III C

In Mountjoy 1999*a* (38–40 and Table II) I have changed the definition of LH III C Middle given in Mountjoy 1986 (133 table II, 155–80) by reassigning Lefkandi Phases 1b–2b. This decision was based on a stylistic reassessment of the pottery in that many features of Lefkandi Phase 2a matched late III C Middle Developed and particularly III C Middle Advanced in the Argolid, while those of Lefkandi Phase 2b matched those of LH III C Late in the Argolid. The decisive factor was the Close Style, which appears in LH III C Middle Advanced in the Argolid. At the time of writing Mountjoy 1999*a* (finished in 1995), no pottery decorated in the Close Style had been mentioned from Lefkandi, but the decoration on a Phase 2a kylix sherd seemed to imitate it (Popham and Milburn 1971, 342 and pl. 55. 3 right). However, the recent full publication of the LH III C pottery from Lefkandi includes a piece of actual imported Close Style found in a Phase 2a context (Evely 2006, 225 n. 83 pl. 40A. 11). At the same time Phase 2a has been split into an early and a mature phase (Evely 2006, 150–66). No concrete equations to LH III C phases at other sites are given in this publication, but in a comparison with Mycenae (ibid. 223) Lefkandi Phase 1b is likened to the Tower Phase (LH III C Early Phase 2) and to the LH III C Middle Developed phase at that site and it is noted that the Developed Phase is very short (223 and n. 58); this corresponds well to Mountjoy 1999*a*, Table II. Lefkandi Phase 2a is then equated to LH III C Middle Developed and Advanced at Mycenae (Evely 2006, 223, and Mountjoy 1999*a*, Table II). Lefkandi Phase 2b is not assigned, but Evely 2006, 228–9 table 2.1 assigns Phase 2b features to 'latest' at Mycenae, that is LH III C Late, and it is noted that 'The latest LH III C at Lefkandi (Phase 3, but already approaching it in Phase 2b)' (ibid. 230), suggesting that Phase 2b is LH III C Late.

This reassessment affects the dating of the end of the shrines at Phylakopi. The Phase 2b destruction of the shrines was dated to LH III C Middle Developed and equated to Lefkandi Phase 2a. LH III C Middle Developed is now mostly equated to Lefkandi Phase 1b, with just some overlap with Lefkandi Phase 2a. The splitting of Lefkandi Phase 2a into an early and mature phase puts the beginning of that phase slightly earlier, so there is more overlap with LHIII C Middle Developed, but otherwise it does not change matters. There are, thus, apparently two options for the date of the destruction in terms of the Lefkandi sequence: it can be dated to Lefkandi Phase 1b or to Lefkandi Phase 2a, since both cover part of LH III C Middle Developed. However, there is a third option, that of LH III C Middle Advanced. Some of the pottery from Phase 2b is LH III C Middle Advanced and should equate to this part of Lefkandi Phase 2a, but there is a problem in that the pottery from the shrines joins from Phase 2a right up through Phase 3c to the debris and surface layers above. So the Phase 2b destruction might date to LH III C Middle Advanced, or the later sherds in it could be out of

context (see Mountjoy 1999*a*, 893 for this pottery). In fact, no very precise correlation can be given for the date of the collapse. The options are:

1. Phylakopi Phase 2b destruction = Lefkandi Phase 1b = LM III C Middle Developed
2. Phylakopi Phase 2b destruction = Lefkandi Phase 2a = LM III C Middle Developed
3. Phylakopi Phase 2b destruction = Lefkandi Phase 2a = LM III C Advanced

The shrines continued in use in Phases 3a–3c and were abandoned in Phase 3c. The pottery from Phase 3 is homogeneous with that from Phase 2b apart from just one or two new features (Mountjoy 1985, 169–70). However, the final use in Phase 3c is dated by a tray found *in situ*, which has parallels to Lefkandi Phase 2, suggesting that the abandonment took place in Lefkandi Phase 2a. It is impossible to know how long Phase 3 lasted after the Phase 2b destruction, but a date in Lefkandi Phase 2a equivalent to very early in LH III C Middle Advanced seems most likely for the abandonment.[4]

The pottery is now all locally made and the paint is matt, unless otherwise stated. Closed shapes include large piriform jars, collar-necked jars, large and small stirrup jars, straight-sided alabastra, neck-handled jugs and stirrup jars. A straight-sided alabastron thought to be FS 98 has turned out to be the legged FS 99; there is a parallel from Paros. Open shapes comprise a very large number of deep bowls and some mugs, stemmed bowls and spouted cups FS 249. There is a rare example of a stemmed krater **261** and a sherd from a second **262**, which might, however, belong to the amphoroid type of Minoan derivation. The stemmed krater is also found in this phase at Koukounaries on Paros (for example Schilardi 1977, pl. 190–1*a*). The decoration of both the 1911 kraters has parallels in the east Aegean and at Ugarit in the syntax of the handle banding and the composition of the triglyphs. Similar triglyphs can be seen at Miletos, as also the handle banding on the second krater, which is the east Aegean type with the handle ring set with its back to the handle so that it frames the decorative zone (Weickert 1957, pl. 33, 34. 1, Mountjoy 1999*a*, Astypalaia nos. 6–7). Another east Aegean correlation is supplied by a collar-necked jar sherd **240** which has a stemmed spiral set into the loop of an antithetic spiral in a manner similar to that on a LH III B piriform jar and on a LH III C Early amphoroid krater from Astypalaia: Armenochori (Mountjoy 1999*a*, Astypalaia nos. 5, 7). A fragment, possibly from a neck-handled jug **254**, has a framed wavy line below the decorative zone in a similar manner to that on amphoroid kraters from Ugarit; these kraters are generally thought to be exported from the east Aegean or from Miletos (Mountjoy 2004*a*, *passim*). I have earlier noted correspondences with the pottery from Koukounaries on Paros and suggested a pottery koine for this part of the Cyclades (Mountjoy 1999*a*, 45, 932–33). It now seems that this LH III C Early koine in the Cyclades, as yet little known, represented by a few definitive pieces as regards shape and decorative syntax, might have extended across the Aegean to Astypalaia and Miletos.

Spiral in various forms is the most popular motif followed by panelled pattern. A particular version of panelled pattern with concentric large and small groups of semicircles appears in LH III B on the mainland (Voigtländer 2003, pl. 43 HS 66–8, pl. 63 Si 43–5, 47–8) and becomes popular at Phylakopi in LH III C, where it appears on kraters, deep bowls, and stemmed bowls. Other patterns present include triangular patch, joining semicircles, net,

[4] The description in Mountjoy 2007, Part II 344 is based on the old correlation. Although published in 2007, the chapter was written in 1984 and updated in 1987 (see Mountjoy 2007 307 n. 1).

quirk, wavy line, and triangles. There are also monochrome kylikes and deep bowls decorated in streaky red or black paint.

The pieces datable to LH III C Middle from the 1911 excavations, as opposed to the LH III C Early shapes and motifs which continued in use, comprise only the sherd which joins the large piriform jar with zones of running spirals and jagged zigzag at the base of the neck found in the recent excavations and the straight-sided alabastron **249** with necklace pattern and jagged zigzag. Necklace pattern begins in Lefkandi Phase 2a in LH III C Middle Developed at the earliest. Jagged zigzag[5] is in use on the mainland in late LH III B and LH III C Early, for example, in the Argolid at Tiryns (Voigtländer 2003, pl. 33. S303–4) and in Phocis at Delphi (Mountjoy 1999*a*, Phocis no. 175).

Piriform jar FS 37/38 (FIGS. 16–17)

A large fragment from the 1911 excavations, which is now missing (Dawkins and Droop 1911, pl. 14. 39) should belong to an almost complete vessel from the 1974–7 excavations, FIG. 16, which dates to LH III C Middle Developed (Mountjoy 1985, 172).[6] It was found in the West Shrine and Street and belongs to Phases 2b+3a. The vase has jagged zigzag on the rim and at the neck base and three zones of running spiral on the shoulder running from bottom left to top right. In contrast, the spirals on **234–5** run from top left to bottom right. **234** has similar zones of spirals to Mountjoy 1985, 81, but not enough of **235** is extant to know if it had the same syntax. The spirals on **234** have the open centre found in LH III C (Furumark 1941, 355 and fig. 30 FM 46. 58). It is also possible that **234–5** belong to the large collar-necked jar, as an example from Koukounaries has two zones of similar spirals on the belly (Schilardi 1984, 197, fig. 7 *e*).

234 Grey fired buff; shaded-brown paint. Silver mica. FM 46, zones of running spiral.
235 Grey fired buff; shaded-brown paint. Silver mica. FM 46, running spiral.

Amphoriskos FS 59 (FIG. 17)

236–7 may belong to this small shape, which is not otherwise represented at the site. Alternatively **236** could come from the belly of a small collar-necked jar FS 64, such as **243**, but it is very small even for FS 64. It depicts antithetic joining semicircles flanking a narrow band in a somewhat similar style to the isolated semicircles on the alabastron **250**. There is a parallel to the motif from Tiryns in the belly zone of a stirrup jar (Voigtländer 2003, pl. 137. 64), which suggests **236** might belong to that shape; however, the decorative zone of **236** is rather wide for it to be assigned to a stirrup jar. The flaring everted rim suggests **237** is an amphoriskos. There is much variety in the shape of the rim, but examples from Perati provide a good parallel (Mountjoy 1999*a*, Attica nos. 309–12, also Rhodes no. 140).

236 Grey fired deep buff; red-brown to black paint. FM 42, joining semicircles.
237 Grey fired orange-buff; buff slip, orange-brown paint. FM 75, panelled.

[5] I initially used the term 'jagged wavy line' as this motif does not match the zigzag FM 61, except perhaps FM 61. 3 with four sides. The motif falls between this and the wavy line FM 53. 18, as I have noted (Mountjoy 1985, 183). In Mountjoy 1986; 1999*a*, I have used the term 'jagged zigzag'. Both terms apply to the motif, but neither is absolutely correct.

[6] I assigned this shape to the LH III B–C FS 37 (Mountjoy 1985, 172). However, the true LH III C large piriform jar is FS 38 (Furumark 1941, 590), so I have used this (Mountjoy 1986, fig. 201; 2007, 345), but there is some uncertainty as FS 38 is described as having a relatively high torus base (Furumark 1941, 590), which does not apply to Mountjoy 1985, 81, so I have reverted to FS 37 (Mountjoy 1999*a*, Melos no. 186). Neither FS is satisfactory; more complete examples from the Cyclades are needed to facilitate a correct assignation.

FIG. 16. LH IIIC: piriform jar. 1911 excavations + 1974–77 excavations (Mountjoy 1985, fig.5.10.81).

Collar-necked jar FS 63, 64 (FIG. 17)

A number of pieces can be assigned to the large FS 63, but only those with shoulder handle **240** or lug **241** certainly belong to this shape. The narrow decorative zone of **239** suggests a collar-necked jar, as it is too narrow for that of a large piriform jar or a narrow-necked jug FS 121. It has the LH III C spiral with open centre, similar to that on **234**. The spirals have extra loops in the tangents. This feature is very popular on locally made Mycenaean pottery at Troy (Mountjoy and Mommsen 2006, 110, fig. 8. 67, 112, fig. 11. 87). However, **239** seems to be a local product. The back legs and tip of the tail of a quadruped are painted in silhouette style **238**. There are parallels to the quadruped on a collar-necked jar from Mycenae (Vermeule and Karageorghis 1982, xi. 13). Krater sherds decorated in this style also come from the 1896–9 excavations (Mountjoy 2007, fig. 8. 27. 455–6; for similar quadrupeds in this style, see Mountjoy 2006, 117, fig. 7). **240** has a stemmed spiral tucked into the loop of an antithetic spiral. It may well have been similar to the antithetic spiral on a LH III B piriform jar from Astypalaia: Armenochori (Zervoudaki 1971, pl. 560 *b*; Mountjoy 1999*a*, Astypalaia

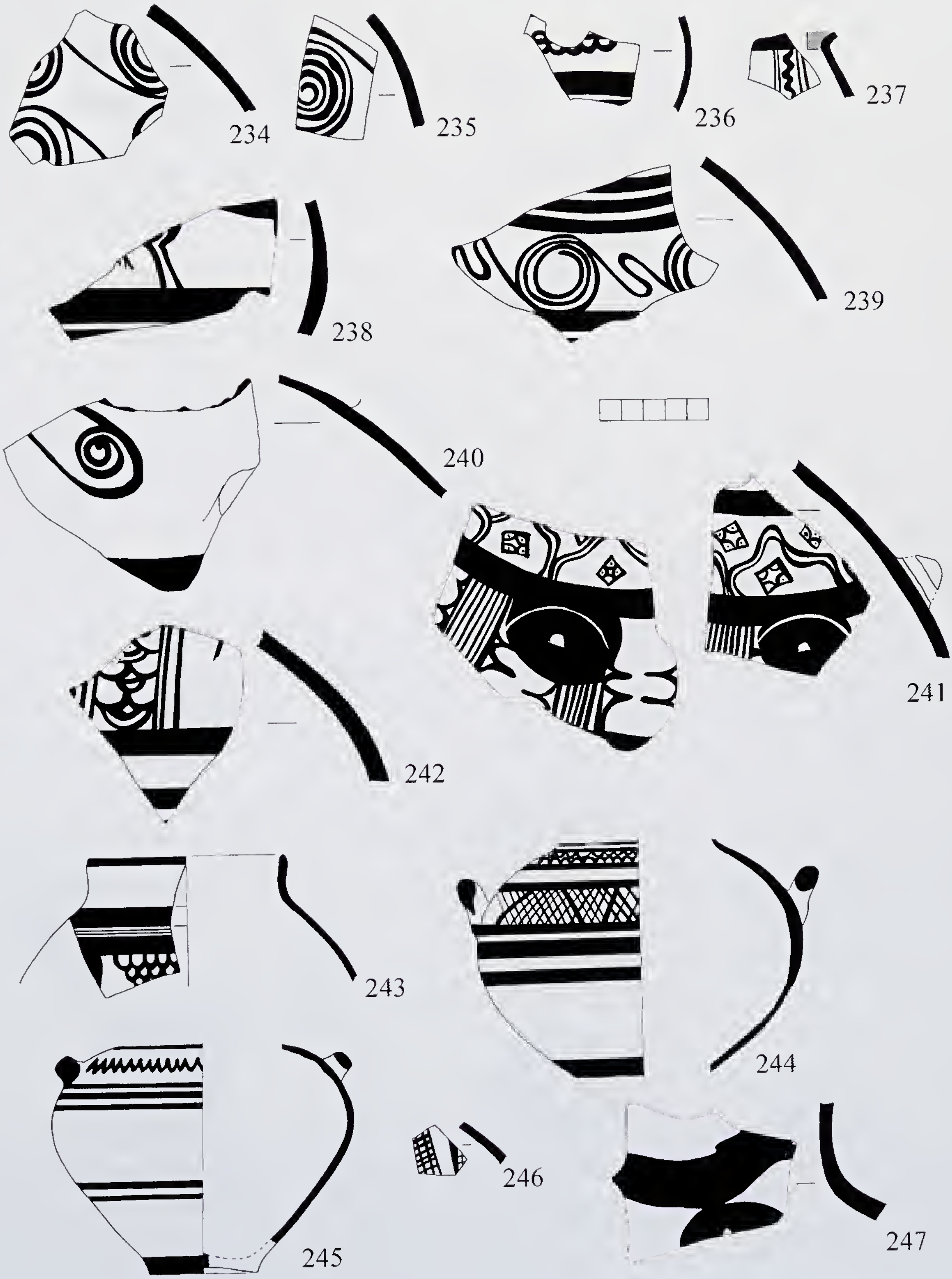

FIG. 17. LH IIIC: **234–35** piriform jar, **236–37** amphoriskos, **238–46** collar-necked jar, **247** amphora/hydria.

no. 5) and to another such stemmed/isolated spiral on an amphoroid krater from the same site depicting antithetic spiral with multiple loops; it has similar stemmed/isolated spirals tucked into the loops (Zervoudaki 1971, pl. 558 *b*; Mountjoy 1999*a*, Astypalaia no. 7). The decorative zone of **240** is too narrow for that of a piriform jar (compare with Mountjoy 1999*a*, Astypalaia no. 5). The panelled pattern with arrow fringe on **241** is usually found in LH III B1 (see French 1967, 233 for the date), but **241** is a locally made LH III C vessel, as also an example from the 1896–9 excavations (Mountjoy 2007, fig. 8. 24. 444). The filling motif of lozenge with semicircles with dot fill in each corner begins in LH III B (Furumark 1941, FM 73, fig. 71 *f*) and continues into LH III C Early. **242** could belong to this shape or to a piriform jar.

243–6 are the smaller FS 64. **243** has the typical collar neck of this shape; its small size assigns it to FS 64. It has triangular patch which appears in LH III B2 and continues in LH III C Early (Mountjoy 1999*a*, LH III B2 Phocis nos. 141–43, LH III C Early Attica no. 310). **245** has jagged zigzag, a popular motif at Phylakopi (Mountjoy 1985, figs. 5. 10. 81, 5. 16. 228, 5. 17. 246). The horizontal shoulder handles are strap rather than the usual round handle. **244** has a local decorative scheme with net in the belly zone and antithetic joining semicircles on the shoulder; the net is divided into vertical zones by thick diagonal lines. **244** has the same Museum Inventory number as **250**. **246** is assigned from its section, which is too thick for the amphoriskos. It seems to have cross-hatched triangle, but it could be that diagonal groups of net are represented (see Mountjoy 1999*a*, Laconia no. 157 with vertical groups of net for an idea of the syntax).

238 FS 63. Buff with one or two white grits; white-buff slip, brown-orange paint. FM 8, quadruped.
239 FS 63. Grey fired buff; white slip, red-brown paint. FM 46, running spiral.
240 FS 63. Grey fired buff; white-buff slip, black paint. FM 50, antithetic spiral.
241 FS 63. Lugs on belly. Grey fired buff; black paint. FM 62, tricurved arch with lozenge fill on shoulder, FM 75, panelled pattern with arrow fringe on belly.
242 FS 63. Pinkish-buff; buff slip, black to shaded-brown paint. Much gold mica. FM 75, panelled with bivalve fill.
243 FS 64. Grey fired pink-buff; black to orange-brown paint. D. (rim) 9. FM 42, triangular patch.
244 FS 64. Semi-coarse fabric. Salmon fired buff; red-brown paint. D. (max.) 15, H. (ex.) 10.8. FM 42, joining semicircles on shoulder, FM 57, net on belly. MM 388.
245 FS 64. Grey fired buff; black to brown paint. D. (base) 5, H. (ex.) 10.6. FM 61, jagged zigzag. MM 391.
246 FS 64. Buff; dark brown paint. FM 61A, triangle.

Amphora/hydria FS 69/128 (FIG. 17)

247 could belong to an amphora or to a hydria. It seems to have wavy line on the shoulder.

247 Grey fired buff; black paint. ?FM 53, wavy line.

Alabastron, straight-sided FS 96, 99 (FIG. 18)

248 has a simplified version of triangular patch close to that on an example from Perati (Mountjoy 1999*a*, Attica no. 310). **249** has necklace pattern on the shoulder and jagged zigzag on the sides. Necklace pattern starts at Lefkandi in Phase 2a (Evely 2006, 228–9 Table 2. 1), earlier than at Mycenae, where it begins late in LH III C Middle Advanced (see French 2007, 527, fig. 2). I have redated Lefkandi Phase 2a from LH III C Middle Developed to LH III C Middle Advanced (Mountjoy 1999*a*, 38–40 and Table II), but there is still some overlap of Phase 2a with LH III C Middle Developed, so the Developed date assigned to **249** should

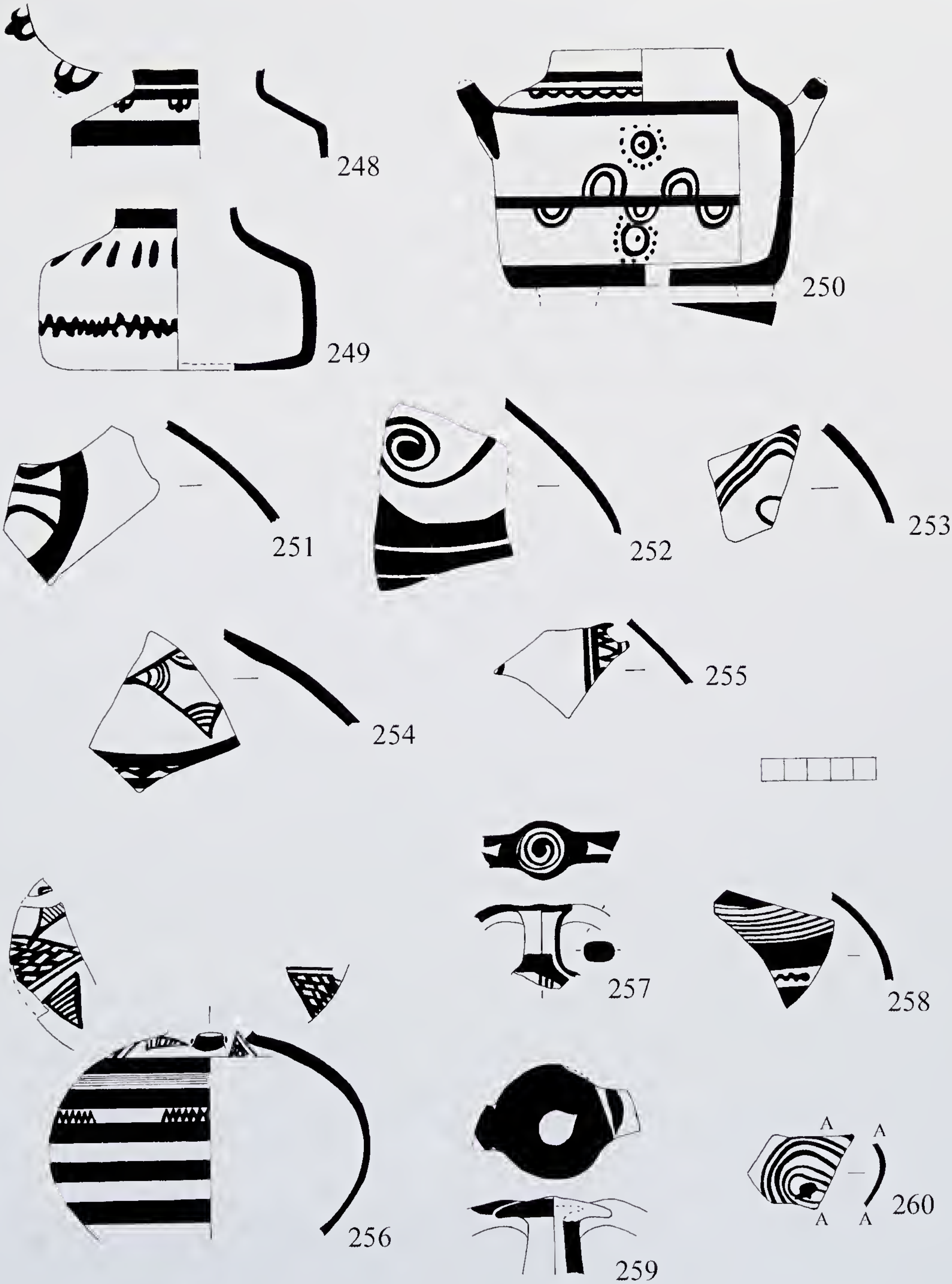

FIG. 18. LH IIIC: **248–50** straight-sided alabastron, **251–55** narrow-necked jug, **256–59** stirrup jar, **260** askos.

stand, but an Advanced date cannot be ruled out. I have described **250** (Mountjoy 2007, 347) as FS 98 following Furumark's assignation of it to this shape (Furumark 1941, 600 FS 98. 5) and have stated that the legged FS 99 is not present at Phylakopi (Mountjoy 2007, 347), as I had not been able to handle **250**. However, on handling the piece for this study I found the breaks for three legs on the underside of the base. The vessel is decorated in a simple local technique with semicircles with rosette. There is a three-legged alabastron from Koukounaries with similar double pendent semicircles to those on **250** (Schilardi 1984, 107, fig. 7 *h*). **250** has the same Museum Inventory number as **244**.

248 FS 96. Grey fired buff; black to brown paint. D. (max.) 11. FM 42, triangular patch.
249 FS 96. Grey fired pink; whitish slip, black paint. D. (base) 12. FM 72, necklace on shoulder, FM 61, jagged zigzag on body. MM 406. Mountjoy 1999*a*, Melos no. 190; 2007, fig. 8. 22. 439.
250 FS 99. Marks of leg joints on underside of base. Buff; lustrous brown to orange paint. D. (rim) 7.8, (base) 11.4, H.10.4. FM 42, joining semicircles on shoulder, FM 27, dot rosette and FM 43, semicircles on body, base monochrome on underside. MM 388. Dawkins and Droop 1911, pl. 12. 73.

Narrow-necked jug FS 121 (FIG. 18)

This is a large shape, as the two restored examples from the 1896–9 excavations (Mountjoy 2007, fig. 8. 24. 442) and the recent excavations (Mountjoy 1985, fig. 5. 12. 111) demonstrate (see also an example from Koukounaries, Schilardi 1977, pl. 190 *b*). The sections of **251–5** are very thin but it is clear that the sherds belong to large shapes; the decoration suggests a jug rather than a piriform jar. **251** has the edge of a circular motif; it might be a chariot wheel with the usual cross in the centre and a semicircle in each quadrant. I can find no representation of chariot wheels with this filling motif, but it might be that a loose wheel is depicted, as on the hydria Mountjoy 1985, fig. 5. 28. 208, where, perhaps, extra adornment was in order. **252** seems to have rock pattern between stemmed spirals. **253** has tricurved arch with filling motif of quirk represented as semicircles (Furumark 1941, fig. 68 FM 62 Fill Ornaments bottom row). **254** has lozenge with semicircles in the corners, a common filling pattern on this motif in LH III C (Furumark 1941, fig. 71 FM 73. 4). However, the wavy line below the decorative zone is unusual, as FS 121 normally has no zonal decoration below the shoulder. It is reminiscent of amphoroid kraters from Ugarit (Mountjoy 2004, 195, fig. 4 *c*, Yon *et al.* 2000, 220, fig. 10 Cat. 69). The triglyph on **255** is a twin to that on the jug Mountjoy 1985, fig. 5. 12. 107.

251 Grey; buff slip, lustrous dark brown paint. ?FM 41, circular motif.
252 Buff; pale yellow slip, lustrous red-brown paint. FM 51, stemmed spiral with rock pattern.
253 Grey fired buff; shaded-brown paint. Much fine silver mica. FM 62, tricurved arch with quirk fill.
254 Burnt. Semi-lustrous black to brown paint. Silver mica. FM 73, lozenge on shoulder, FM 53, wavy line below shoulder.
255 Buff; orange-brown paint. Silver mica. FM 75, panelled pattern with edge of main decoration.

Stirrup jar FS 174 (FIG. 18)

The shape is not common. There is a twin to the decoration of triangles and bivalve on **256** (in Mountjoy 1985, fig. 5. 12. 114), except that the latter has quirk in the belly zone not zigzag. This may be a local type. **257** may have the edge of a hatched triangle attached to the loop linking the false neck to the spout. **258** has a decorated belly zone with tight, narrow wavy line; there are parallels from Tiryns (Voigtländer 2003, pls. 135. 6,136. 25–6). A stirrup jar with a similar motif in the belly zone comes from the recent excavations from PLa (Mountjoy

2007, fig. 8. 6. 80). Trench PLa is adjacent to the 1911 excavations; it might be that the two pieces belong together, but the clay and paint of **258** differ from that of **80**, so they are probably not from the same vessel. **259**, from a large vessel, has a slightly coned false mouth, which is monochrome with a reserved centre circle; the handles are barred. The vessel does not seem to be the large transport type FS 164, as this shape does not normally have a coned false mouth.

256 Grey fired brick; buff slip, semi-lustrous shaded-brown paint. D. (max.) 13.9. FM 61A, triangle with FM 25, bivalve on shoulder, FM 61, zigzag in belly zone. MM 389.
257 Buff; black to brown paint. D. (false mouth) 2.6. Edge of decoration.
258 Grey fired buff; black to brown paint. FM 53, wavy line in belly zone.
259 Grey fired buff; semi-lustrous black paint. D. (false mouth) 4.9. Monochrome false mouth with reserved centre, bars across handle.

Askos FS 194 (FIG. 18)

260 may belong to this shape. The untidy spiral and matt paint suggest a LH III C date.

260 Pinkish; buff slip, orange-brown paint. Spiral.

Krater FS 9 (FIG. 19)

This shape is rare in LH III C, but there are several examples from Koukounaries (Schilardi 1977, pl. 190–1, Koehl 1984, 213, fig. 4. 1–2). **261** is reconstructed on paper using both sides, thus the triglyph by the left handle is actually from the reverse side of the vase. The monochrome interior is unusual on this shape. There are parallels to the triglyph decoration on an amphoroid krater from Ugarit (Yon *et al.* 2000, Cat. 68), one of several thought to be imported from the east Aegean. The Ugarit vase also has a triglyph of simple vertical lines flanked by untidy joining semicircles which degenerate into a wavy line. **261** has a band down each handle edge; the handle is broken at the base, but it is clear that the bands run into the handle ring. **262** is from a krater with similar decoration, but it has an unpainted interior. A small part of the edge of the handle ring can be seen on the right edge of the sherd; the vertical band next to it before the triglyph is the edge of the semicircle framing the decorative zone. The semicircle has its back to the handle, that is instead of framing the handle, as the ring on **261**, it is framing the decorative zone in the east Aegean fashion, as seen on kraters and piriform jars (Mountjoy 1999*a*, 1142 and Astypalaia nos. 6–7, Rhodes nos. 125, 127, 130, and Ugarit Yon *et al.* 2000, Cat. 68). It is possible **262** belongs to an amphoroid krater, but there is a LH III B stemmed krater FS 9 from Astypalaia with this syntax (Mountjoy 1999*a*, Astypalaia no. 3). As no amphoroid kraters of Minoan type of LH III C Early date are known so far in the Cyclades, it seems better to assign **262** to FS 9, but it might be that it is the first known Cycladic example of this type of amphoroid krater (see Mountjoy 1999*a*, 1139 for the Minoan type of amphoroid krater). There is, indeed, one from Perati (Mountjoy 1999*a*, Attica no. 308).

261 Deep buff; light grey slip ?burnt, shaded-brown paint.. D. (rim) *c.*28, H. (ex.) 16.8. FM 75, panelled pattern, monochrome interior. Inv. 139.
262 Pinkish; buff slip, lustrous black to brown paint. FM 75, panelled pattern by handle splash.

FIG. 19. LH IIIC: **261–62** krater, **263–64** cup, **265–69** mug, **270–72** spouted cup.

Cup FS 215 (FIG. 19)

263 has a very globular body with a lumpy interior which has been smoothed; it may be handmade. The decoration of a double wavy line suggests it may be LH III C Middle. **264** may depict tricurved arch, an unusual motif on a cup; alternatively a multiple zigzag may be represented. The interior is unpainted and does not have the usual interior rim band.

263 Buff with lumps, smoothed on interior; semi-lustrous black paint. D. (rim) 8. FM 53, double wavy line.
264 Pink; buff slip, shaded-brown paint. Silver mica. D. (rim) 11. ?FM 62, tricurved arch.

Mug FS 226 (FIG. 19)

A number of sherds belong to vessels of large size. **265** has the LH III C spiral with open centre. **266** with very worn white slip may be a rare LH III C import. The triglyph has a fill of solid bivalves with an in-curving instead of a round top. There is a good parallel to the bivalves on a krater from Koukounaries in the loop of an antithetic spiral (Schilardi 1977, pl. 190–1 *a*, 1984, 196, fig. 6 *f*). **267** has the usual triglyph with vertical zigzag, but **268** has a triglyph composed of vertical bands of net pattern. **269** is probably linear with three badly painted bands rather than having a wavy line below two rim bands.

265 Grey fired buff; whitish slip, lustrous dark brown paint. Silver mica. FM 46, running spiral.
266 Orange; worn white slip, brown paint. FM 75, panelled with FM 50, antithetic spiral.
267 Grey fired orange-buff; buff slip, shaded-brown paint. FM 75, panelled pattern.
268 Grey fired buff; dark brown paint. Silver mica. FM 75, panelled pattern.
269 Buff with white grits; semi-lustrous orange-brown paint. Linear.

Spouted cup FS 249 (FIG. 19)

The shape can be small **270** or slightly larger **271–2**, but it does not seem to be as large as other examples of this phase from elsewhere (Mountjoy 1999*a*, Paros no. 4, Naxos no. 64, Euboea no. 63, Rhodes no. 230). **270** has a chain of large bivalves with open centre. It has a wide second interior rim band, but it is not deep set as the band on two rims from the recent excavations (Mountjoy 1985, fig. 5. 7. 82–3). In contrast **271–2** do have a deep set interior rim band. **271** is restored on paper. The spout and handle are from the 1911 excavations, but the body sherds AE 485 and AE 2085 are from the 1896–9 excavations (Sherratt 2000, pl. 577 top left). Another spout with a loop below is not illustrated.

270 Orange; buff slip, orange paint. FM 25, bivalve.
271 Grey fired buff; brown to black paint. D. (rim) 15. FM 53, wavy line. Same as AE 485, 2085. Mountjoy 1999*a*, Melos no. 144; 2007, fig. 8. 25.450.
272 Grey fired buff; dark brown to black paint. FM 53, wavy line, edge of decoration on neck.

Krater FS 281 (FIG. 20)

There are very few pieces. **275–6** have a rounded rim instead of the usual angular everted rim (Mountjoy 1986, fig. 188). The usual motifs are present, consisting of semicircles with panelled pattern **273**, running spiral **274–5** and tricurved arch with fill **276**. The decoration on **273** can be better understood from sherds in the Ashmolean Museum (Sherratt 2000, pl. 602. 750 AE 2070, pl. 602. 751 AE 2075). The motif probably does not consist of the usual group of semicircles decreasing in size towards the centre, but rather consists of a small central group of semicircles framed at a distance by a larger group; the number of semicircles varies in each case from single to several (for example, AE 2070 has four coils, AE 2075 has

FIG. 20. LH IIIC: **273–76** ring-based krater, **277–301** deep bowl.

two coils) (for the motif see Furumark 1941, fig. 57 FM 43. 22, the top set of semicircles; see also Voigtländer 2003, pl. 43 HS 66, 68, pl. 63 Si 43–5, 47–8). The stemmed bowl **323** shows a version of the motif. **274** may have two zones of running spiral, but the upper spiral does not seem to have a link to the next spiral; it might be that an elaborate ivy leaf is represented (Furumark 1941, fig. 36 FM 12. 37). **276** has tricurved arch with fill of stemmed spiral; there are similar examples from Phocis (Mountjoy 1999*a*, Phocis no. 223–6). **275–6** have a monochrome interior.

273 Grey fired orange-buff; buff slip, dark brown paint. FM 75, panelled with FM 43, semicircles with edge of handle splash on right side of sherd.

274 Grey fired buff; whitish slip, black to brown paint. FM 46, zones of running spiral.

275 Buff; orange paint. FM 46, running spiral, monochrome interior. Mountjoy 2007, fig. 8. 27. 459.

276 Pale yellow; black to brown paint. D. (rim) 24. FM 62, tricurved arch, monochrome interior. Mountjoy 2007, fig. 8. 27. 460.

Deep bowl FS 284, 285 (FIGS. 20–1)

This is the commonest shape in this phase. It generally depicts panelled pattern as **314–19**, which all have a simple triglyph of vertical zigzag flanked by a single line (there are also two more unpublished scraps). There are several examples with semicircles in panelled pattern **279–81**. They have the same local type of semicircles as on the stemmed bowl **323**. A deep bowl in the Ashmolean Museum (Sherratt 2000, AE 2083 pl. 602. 749) also has this decoration with four small coils framed by two big coils. On **279** the small central group of semicircles is not extant. **277–8** have an unusual local design of linked whorl-shell. This motif dies out in LH III A2 (Furumark 1941, 312 and fig. 51), but **277–8** are locally made LH III C deep bowls. Even though **278** has lustrous paint not matt, it should not be earlier than **277**, especially as it has the LH III C monochrome interior. This suggests the motif continued in use. The spiral is a popular motif; running **282–4**, antithetic **290–301** and stemmed spiral **302–11** are all present (there are also three sherds with stemmed spiral, one sherd with antithetic spiral and two fragments with spirals not illustrated). **283–4** have spirals running from top left to bottom right, whereas **282** runs from bottom left to top right. **283** has the LH III C open centre. **284** and **287** belong to a bowl type at Phylakopi with a very deep inner rim band below the lip reaching below the handle joint; it has a thin upper body, with bulges, sharply flaring at the rim (Mountjoy 1985, fig. 5. 17 bottom row). The upper body of **284** is not very thin, but it has the bulges. There are similar deep bowls with a deep inner rim band from Koukounaries (Koehl 1984, 209, fig. 2. 1). **311** has almost no stem to the stemmed spiral. The large size of this piece, the monochrome interior, and the two broad belly bands might suggest a Group B deep bowl (Mountjoy 1986, 129–30), but the paint is the Phylakopi LH III C matt paint and the piece is locally made. **298** has a fill of semicircles in the loop, which is an LH III C Early feature (see Mountjoy 1985, fig. 5. 16. 222–3 for other examples); another bowl with this fill together with crossbars in the loop is now lost (Dawkins and Droop 1911, pl. 14. 46). **306–7** have a cross-hatched centre to the spiral. **310** is carinated at the belly in the manner of the Transitional LH III B2–III C Early carinated deep bowl (Mountjoy 1997, Type 3, 129, fig. 11), but the sides are extremely flaring and closer to Minoan examples (Mountjoy 1999*b*, pl. cxiii *b*. 3). **310** may belong to a hybrid Minoan–Mycenaean vessel. **286–9** have quirk, that on **287** being very tall and close-set comparable to a III B Minoan type (Hallager and Hallager 2003, pl. 91 *b*. 71–P0813). A similar quirk to **286** can be seen on a

FIG. 21. LH IIIC : **302–22** deep bowl, **323–25** stemmed bowl.

sherd from the 1896–9 excavations (Mountjoy 2007, fig. 8. 28. 471). **289** has an unusual double outline; it seems to be a local variant. **312** has chevrons and **313** possibly tricurved arch. A number of pieces have a monochrome interior. There are also 14 unpublished linear pieces.

320–1 are singled out in Mountjoy 2007, fig. 8. 28. 465 (here **321**), 467 (here **320**) together with two other examples, ibid., fig. 8. 28. 464, 466, as all have an unusually deep rim band; that of **321** (and of ibid. fig. 8.28. 464, 466) is 3 cm deep. These bowls could be examples of the LH III B2 Group B deep bowl. However, **321** has not the monochrome interior of this type; **320** does have a monochrome interior, but the rim band is not deep enough for the Group B deep bowl. **321** has untidy triglyph flanked by dot-fringed half-rosette; **320** has semicircles with triglyph but both elements consist of only a single line instead of the usual multiple lines (see discussion Mountjoy 2007, 352–3 for a LH III C Early date for these pieces; see also Mountjoy 1999*a*, 920). **322** is also anomalous; it has the rim banding of the stemmed bowl on interior and exterior, but does not have the knobbed rim of this shape. It might be a Transitional LH III B2–III C Early Type 1 deep bowl (Mountjoy 1997, 122, fig. 7.41, 42), but it has a very shallow upper body, as can be seen from the section curving in to the belly at the break. The piece may come from a shallow bowl rather than a deep bowl; the decoration cannot be assigned to a particular motif.

277 Grey fired buff; shaded-brown paint. FM 24, linked whorl-shell.
278 Grey fired deep buff; buff slip, lustrous shaded-brown paint. FM 24, linked whorl-shell, monochrome interior.
279 Deep buff; brown-orange paint. Silver mica. FM 43, semicircles.
280 Grey fired buff; black paint. FM 75, panelled with FM 43, semicircles, monochrome interior.
281 Grey fired buff; brown to orange paint. FM 75, panelled with FM 43, semicircles, monochrome interior.
282 Orange; buff slip, black to brown paint. D. (rim) 12.8. FM 46, running spiral, monochrome interior. Mountjoy 1999*a*, Melos no. 163; 2007, fig. 8. 28. 469.
283 Yellow; black to orange paint. D. (rim) 16. FM 46, running spiral, monochrome interior.
284 Pink; buff slip, black to brown paint. D. (rim) c13. FM 46, running spiral.
285 Burnt out of shape. Grey; red-brown paint. D. (rim) 11. Spiral.
286 Buff; black to brown paint. D. (rim) 13. FM 48, quirk.
287 Grey fired buff; black to brown paint. D. (rim) 27 (oval). FM 48, quirk.
288 Buff with white grits; orange-brown paint. FM 48, quirk.
289 Yellow-buff; no slip, orange-brown paint. Silver mica. FM 48, quirk.
290 Buff; matt orange paint. FM 50, antithetic spiral.
291 Buff; orange paint. Silver mica. D. (rim) 17. FM 75, panelled with FM 50, antithetic spiral.
292 Pinkish; buff slip, orange paint. D. (rim) 14. FM 75, panelled with edge of antithetic spiral.
293 Grey fired pinkish; buff slip, shaded-brown paint. Silver mica. D. (rim) 14. FM 75, panelled with FM 74, half-rosette and FM 50, antithetic spiral.
294 Buff; shaded-brown paint. Silver mica. D. (rim) 15. FM 75, panelled with FM 50, antithetic spiral.
295 Grey fired buff; white slip, black to brown paint. D. (rim) 16. FM 75, panelled with FM 50, antithetic spiral.
296 Grey fired buff; dark brown to black paint. Silver mica. FM 75, panelled with FM 50, antithetic spiral, monochrome interior.
297 Buff; yellow slip, red to orange paint. D. (rim) 17. FM 50, antithetic spiral, monochrome interior.
298 Buff; shaded-brown to black paint. FM 50, antithetic spiral with fill in loops.
299 Slightly burnt. Grey fired buff; orange to brown paint. FM 75, panelled with lozenge fill and FM 50, antithetic spiral, monochrome interior.
300 Buff; shaded-brown paint. ?FM 50, antithetic spiral, monochrome interior.

301 Buff; black to brown paint. FM 75, panelled with edge of FM 50, antithetic spiral.
302 Buff; black to brown paint. D. (rim) 13x20 (oval). FM 51, stemmed spiral.
303 Grey fired buff; shaded-brown to black paint. D. (rim) 13. FM 51, stemmed spiral.
304 Buff; brown paint. FM 75, panelled with FM 51, stemmed spiral.
305 Buff; shaded-brown paint. Silver mica. FM 75, panelled with FM 51, stemmed spiral.
306 Grey fired buff; black paint. FM 51, stemmed spiral.
307 Grey fired buff; black paint. FM 51, stemmed spiral, monochrome interior.
308 Oval and bent. Buff fired pinkish; pale yellow slip, black to brown paint. FM 51, stemmed spiral by handle band.
309 Buff; shaded-brown paint. FM 51, stemmed spiral.
310 Buff; black paint. D. (rim) 19. FM 51, stemmed spiral.
311 Grey fired buff; orange-brown paint. FM 51, stemmed spiral with bivalve fill, monochrome interior.
312 Grey fired buff; black to shaded-brown paint. FM 58, chevron, monochrome interior.
313 Deep buff; black to brown paint. ?FM 62, tricurved arch with fill, monochrome interior.
314 Buff; black paint. D. (rim) 15. FM 75, panelled with FM 74, half-rosette.
315 Grey fired buff; black to brown paint. FM 75, panelled with FM 74, half-rosette.
316 Buff; orange paint. D. (rim) 17. FM 75, panelled, monochrome interior.
317 Yellow; buff slip, brown paint. FM 75, panelled, monochrome interior.
318 Grey fired orange-buff; brown paint. FM 75, panelled, monochrome interior.
319 Grey fired buff; white slip, shaded-brown paint. FM 75, panelled, monochrome interior.
320 Buff; black to brown paint. D. (rim) 17. FM 43, semicircles, monochrome interior. Mountjoy 1999*a*, Melos no. 177; 2007, fig. 8. 28. 467.
321 Pink; buff slip, red-brown paint. D. (rim) 17. FM 75, panelled with FM 74, half-rosette. Mountjoy 1999*a*, Melos no. 179; 2007, fig. 8. 28. 465.
322 Grey fired buff; black to brown paint. D. (rim) 16. ?crossed zigzag.

Stemmed bowl FS 306 (FIG. 21)

323–24 have the typical knobbed rim and the monochrome interior often found on this shape in this phase (Mountjoy 1999*a*, Rhodes no. 246). The base **325** also has a monochrome interior. **323** has triglyphs of vertical lines with semicircles consisting of a group of small semicircles in the centre and a single large outer one. The motif is similar to that on the deep bowls **280–1** (see discussion above). **324** could have the edge of a semicircle or the loop of an antithetic spiral by the triglyph.

323 Grey fired buff; black to brown paint. D. (rim) 19. FM 75, panelled with FM 43, semicircles, monochrome interior. Mountjoy 2007, fig. 8. 29. 479.
324 Orange; buff slip, black to orange paint. D. (rim) 18. FM 75, panelled with edge of FM 43/FM 50, semicircles/antithetic spiral, monochrome interior.
325 Buff; white slip, black paint on exterior, maroon on interior. D. (base) 7.8. Linear, monochrome interior.

Monochrome

Closed shape

There are several black painted body sherds belonging to one closed vessel, but not enough was extant for the shape to be identified.

Kylix FS 274 (FIG. 22)

The kylikes are all the conical FS 274. No pieces could be assigned to the rounded kylix (see Mountjoy 2007, 349–50). **326** has a swollen stem, but **329–30** do not. The base generally has a low dome on the underside. The matt paint is often streaky. In addition to the pieces catalogued here, there are also a black painted base and two body sherds and two red painted rims and two red painted stems and three bases.

326 One handle, half of rim and half of base restored. Pinkish; buff slip, streaky black to orange paint. D. (rim) 18 (17 at handles), (base) 7.2, H.17.1–18.4. MM 226. Barber 1974, pl. 6 *e*, Mountjoy 1986, fig. 187.1; 1999*a*, Melos no. 149; 2007, fig. 8. 25.451.
327 Grey fired orange; streaky orange-brown paint. Silver mica. D. (rim) 15. MM 418.
328 Grey fired pink-buff; black paint. Gold and silver mica. D. (rim) 14.6, H. (ex.) 5.
329 Buff; black paint.
330 Grey fired orange; buff slip, black to red paint. Gold mica. D. (base) 7.2. Reserved edge to base. MM 410.
331 Grey fired buff; orange paint. Much silver mica. D. (base) 7.1.

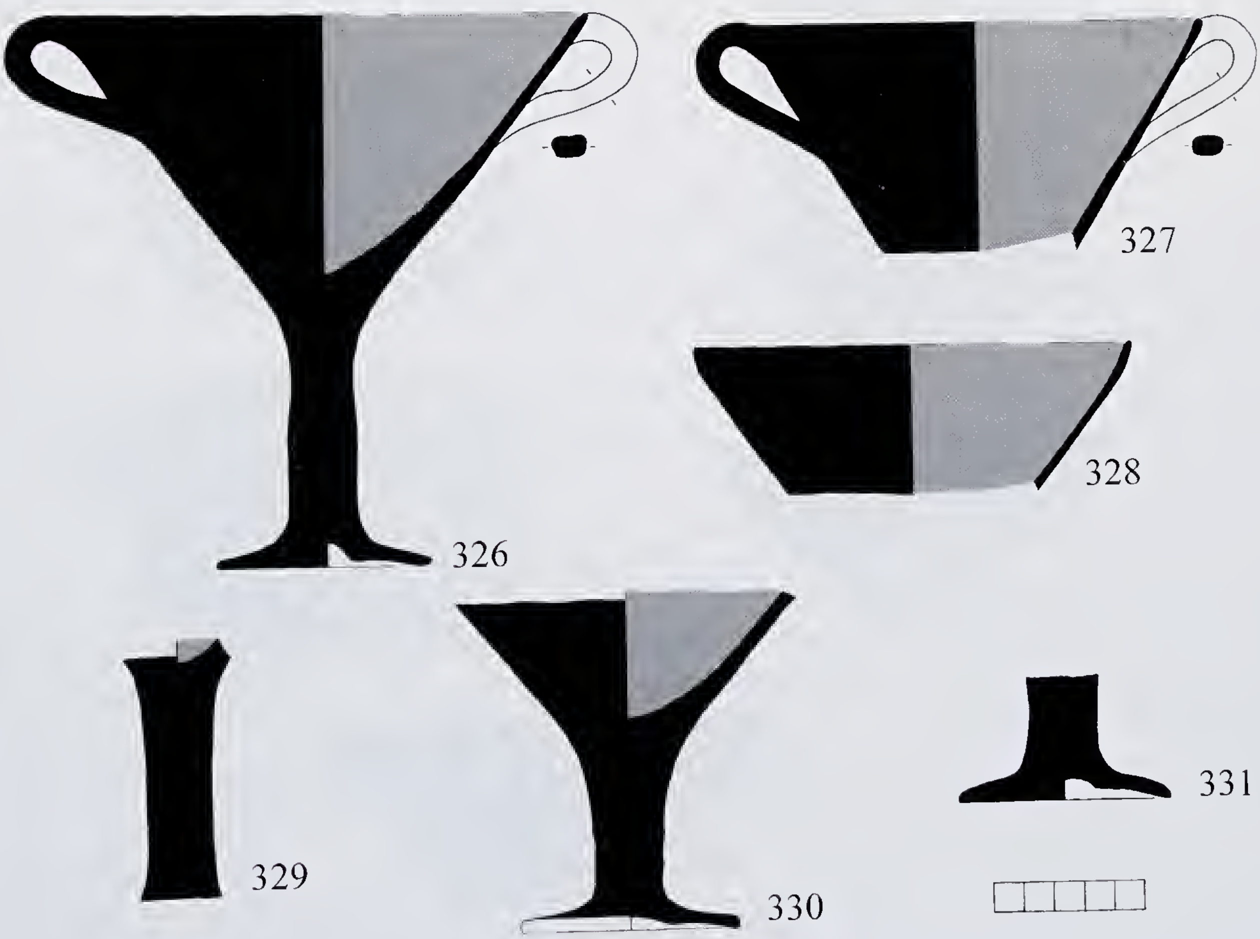

FIG. 22. LH IIIC: **326–31** conical kylix.

Deep bowl FS 284, 285 (FIG. 23)

In contrast to the patterned deep bowl, a number of monochrome deep bowls have the full profile or an almost full profile preserved. The deep bowls illustrated here are bell-shaped with a ring base. Rims are very flaring, except for **338**, which is straight and has a slight thickening similar to that of the stemmed bowl, but there is no precedent at the site for monochrome stemmed bowls. **332** has an unusual slightly inverted lip. The deep bowls have matt orange or black paint, often streaky; there is a small reserved area between the handle stubs. Material not catalogued includes 10 black painted rims, 3 handles, 25 body sherds and 2 red painted rims, 1 handle and 8 body sherds.

332 Buff; black to orange paint. Silver mica. D. (rim) 14, (base) 5, H.10. Inv. 143. Mountjoy 1999*a*, Melos no. 181; 2007, fig. 8. 29.477.

333 Buff; black paint. Much silver mica, some gold. D. (rim) 10 × 16 (oval), (base) 4.6, H.10.5. Small reserved area between handle stubs. MM 408.

334 Grey fired buff; black paint. D. (rim) 15, H. (ex.) 9.

335 Grey fired orange; red to orange paint. Much silver mica, some gold. D. (rim) 14.8, H. (ex.) 9.5. MM 414.

336 Grey fired buff; streaky orange paint on exterior, black on interior. D. (rim) 13.6, H. (ex.) 8.1. Reserved area between handle stubs.

337 Buff; black paint. D. (rim) 12, H. (ex.) 8.8.

338 Grey fired buff; black paint. D. (rim) 10 × 16 (oval), H. (ex.) 9.4. Small reserved area between handle stubs.

339 Buff; streaky black paint. Silver mica. D. (base) 4.5. MM 416.

340 Buff; black paint. D. (base) 6.6. MM 446.

UNPAINTED

Only a very small amount of fine unpainted ware has been kept. The fabric of unpainted fine ware has been divided by Wardle (1969, 281) into polished, standard, and rough. Standard and rough fabrics are present here. Standard fabric is smoothed, but rough fabric is left unsmoothed so that the wheel marks show.

Three kylix bases, one tall stem, one fragmentary stem, one rim, and two body sherds could not be closely assigned.

LH II B–III A1 (FIG. 24)

Kylix, carinated FS 261

341 has the short straight upper body with flat everted rim and almost non-existent stem which are early features. Parallels to the lower body from Athens (Mountjoy 1981, fig. 10. 90) and to the rim from Asine (Frizell 1980, fig. 9.169) suggest a LH II B–III A1 date (see Mountjoy 2007, 359).

341 Grey with a few small grits fired brown, standard, worn. D. (rim) 12, (base) 6.4, H.8.6. MM 356. Mountjoy 2007, fig. 8. 31.481.

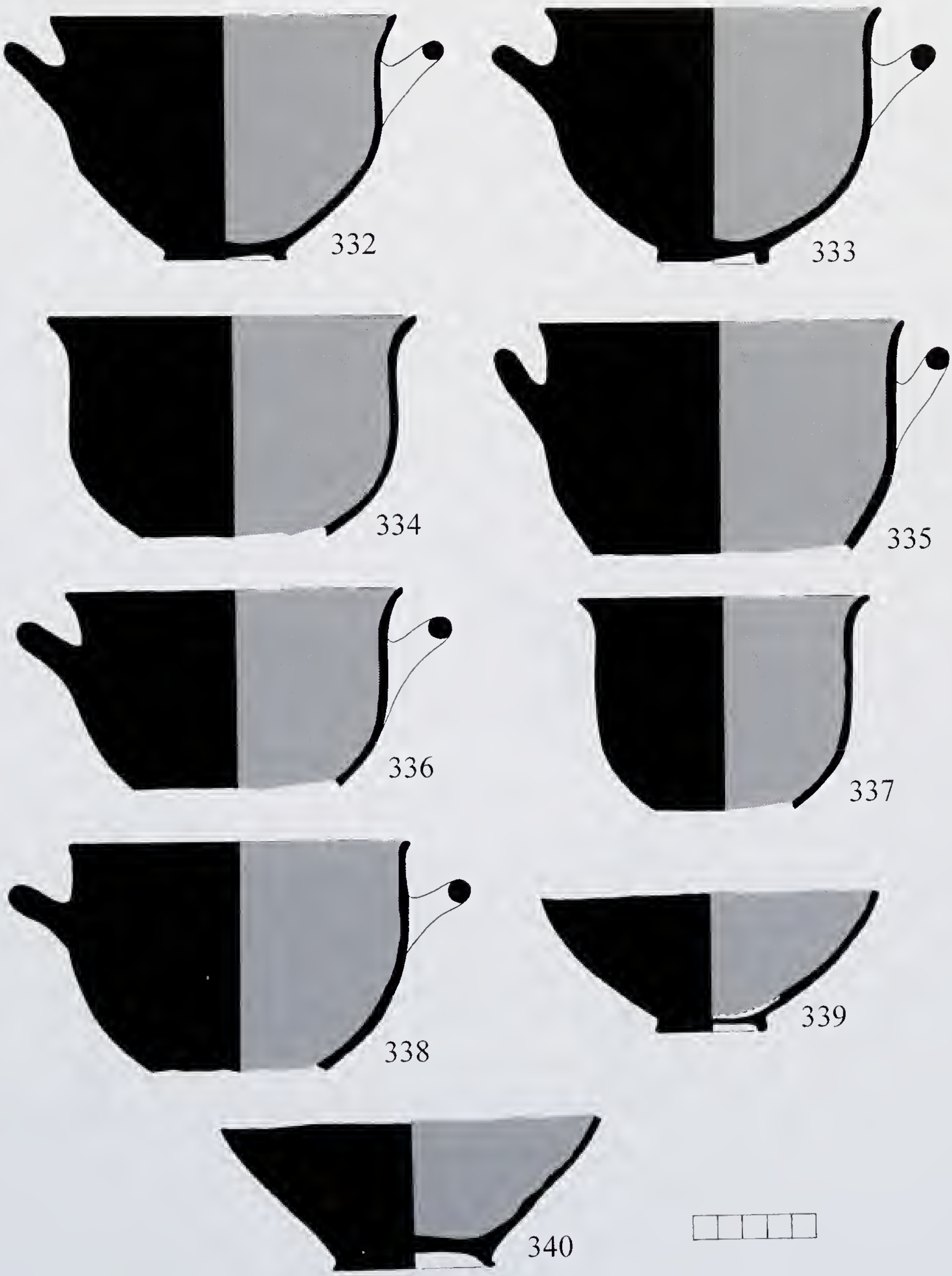

FIG. 23. LH IIIC: **332–40** deep bowl.

LH III A1 (FIG. 24)

Goblet FS 264

The very globular body and longer rim of **342–5** are typical of this phase. There is one more rim with handle not illustrated.

342 Buff fired pink-buff; buff slip, polished. D. (rim) 14.
343 Buff; polished. D. (rim) 16.
344 Buff fired salmon; buff slip, polished. D. (rim) 15.
345 Deep salmon fired buff; polished. D. (rim) 17.

Kylix

The long everted rim and shallow bowl suggest a date in this phase for **346**. The bowl is similar to that of the shallow cup FS 219, but the lower body of **346** is rather conical for a cup. It has a similar shape to the goblet **126**, which seems to be locally made, but **346** has a shallower bowl closer to that of the kylix. It should be an early version; there are contemporary decorated examples (Mountjoy 1986, fig. 76).

346 Grey with white and brown grits fired deep pink; buff, standard. D. (rim) 14.

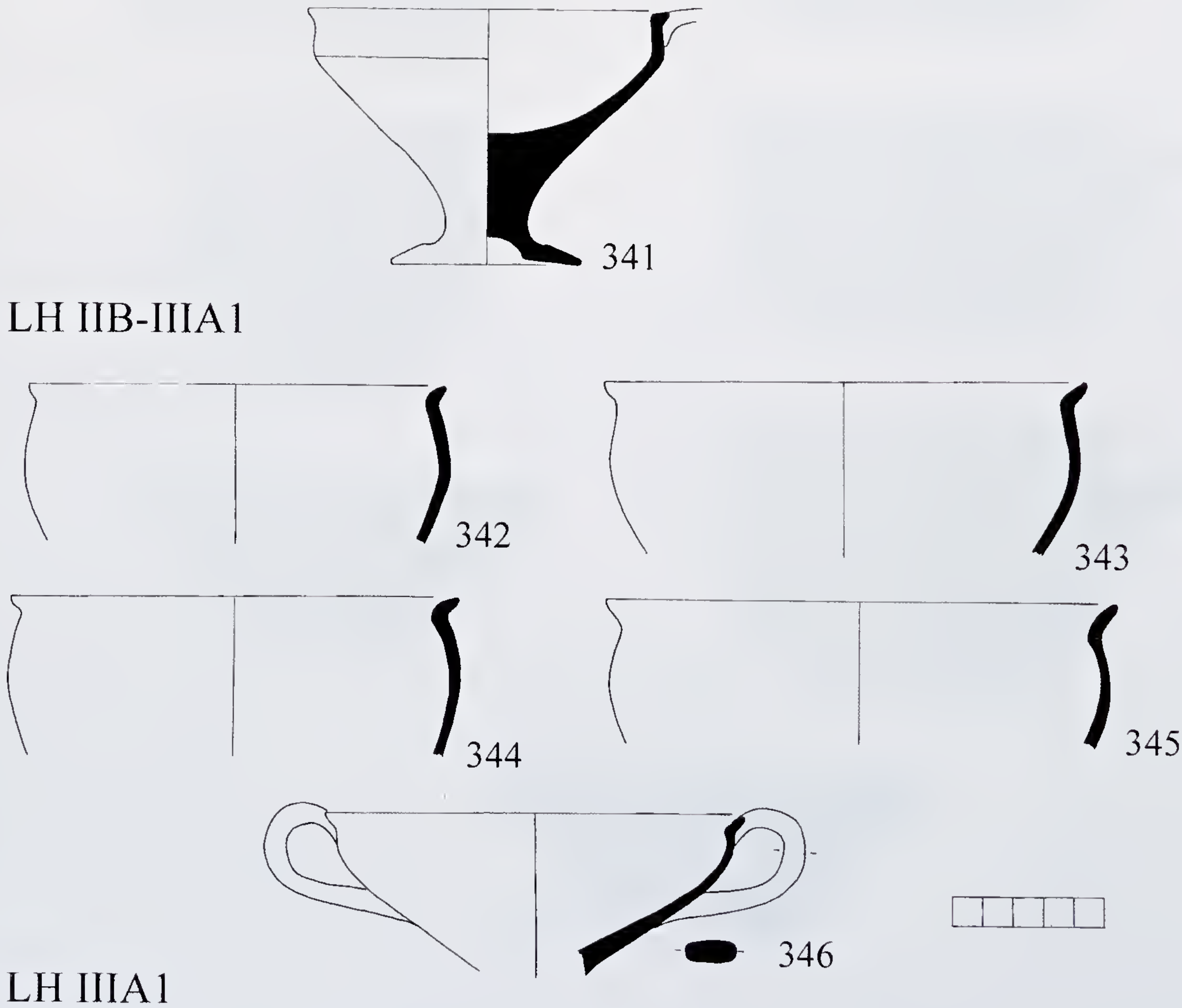

FIG. 24. LH IIB-IIIA1: **341** carinated kylix; LH IIIA1: **342–45** goblet, **346** kylix.

LH III A2

There are five kylix rims with rounded lips which might belong to this phase.

LH III B (FIG. 25)

Kylix, rounded FS 264, 265, 266

The tall stem of **347** belongs to a rounded kylix. The lower body is already curving into the bowl suggesting it might be FS 264 (see Mountjoy 2007, fig. 8. 32. 215 for a parallel). The deep conical bowl suggests **348** is FS 265 (ibid., fig. 8. 32. 226, 485); the shape dates to LH III A2–III B1. The very shallow bowl of **349** should belong to FS 266.

347 FS 264. Pink-buff fired buff, polished. D. (base) 6.
348 FS 265. Grey fired buff, rough, smoothed. Silver mica. D. (rim) 18. MM 348. Mountjoy 2007, fig. 8. 32. 485.
349 FS 266. Buff with grits, standard. Gold and silver mica. D. (rim) 18.

Kylix, carinated FS 267

350–2 with short straight upper body and lipless rim should belong to this phase. There are good LH III B1 examples from Mycenae (Wardle 1969, 286, fig. 10. 96–101; Mountjoy 1976, 99, fig. 12. 44–56), but they differ from the Melian examples in that the upper body is flaring in every case, except 1976, fig. 12. 144–45, 153–54. The latter are a good parallel to **351–52**. **350** has a slightly concave upper body with a flaring lipless rim.

350 Pinkish; buff slip, rough. D. (rim) 12–12.2, (base) 6.6, H.10.8–11. MM 355.
351 Buff, standard, worn. D. (rim) 12, (base) 6.2, H.10.5. MM 427. Mountjoy 2007, fig. 8. 31. 482.
352 Pinkish, rough, smoothed. Silver mica. D. (rim) 11.5, (base) 6.5, H.10.3–5. MM 361. Mountjoy 2007, fig. 8. 31. 483.

LH III C EARLY/DEVELOPED (FIG. 25)

Kylix, carinated FS 267

353–4 have the usual small diameter and low domed base, but they also have the deep concave upper body of the LH III C type (compare with the LH III B **351–2** and with LH III C Mountjoy 1985, figs. 5. 20. 351–3, 5. 24. 395).

353 Grey fired pinkish; buff slip, rough, smoothed. D. (rim) 12.2–4, (base) 6.2, H. 10.4–8. MM 357.
354 Orange-buff, standard. Much fine silver mica. D. (rim) 12, H. (ex.) 10.4. MM 216.

Kylix, conical FS 274

The swollen stem dates **355** to this phase. The stem is too tall for FS 267, but the lower body is rather wide for a conical kylix.

355 Grey fired pink; buff slip, rough. Silver mica. D. (base) 7.1. MM 426.

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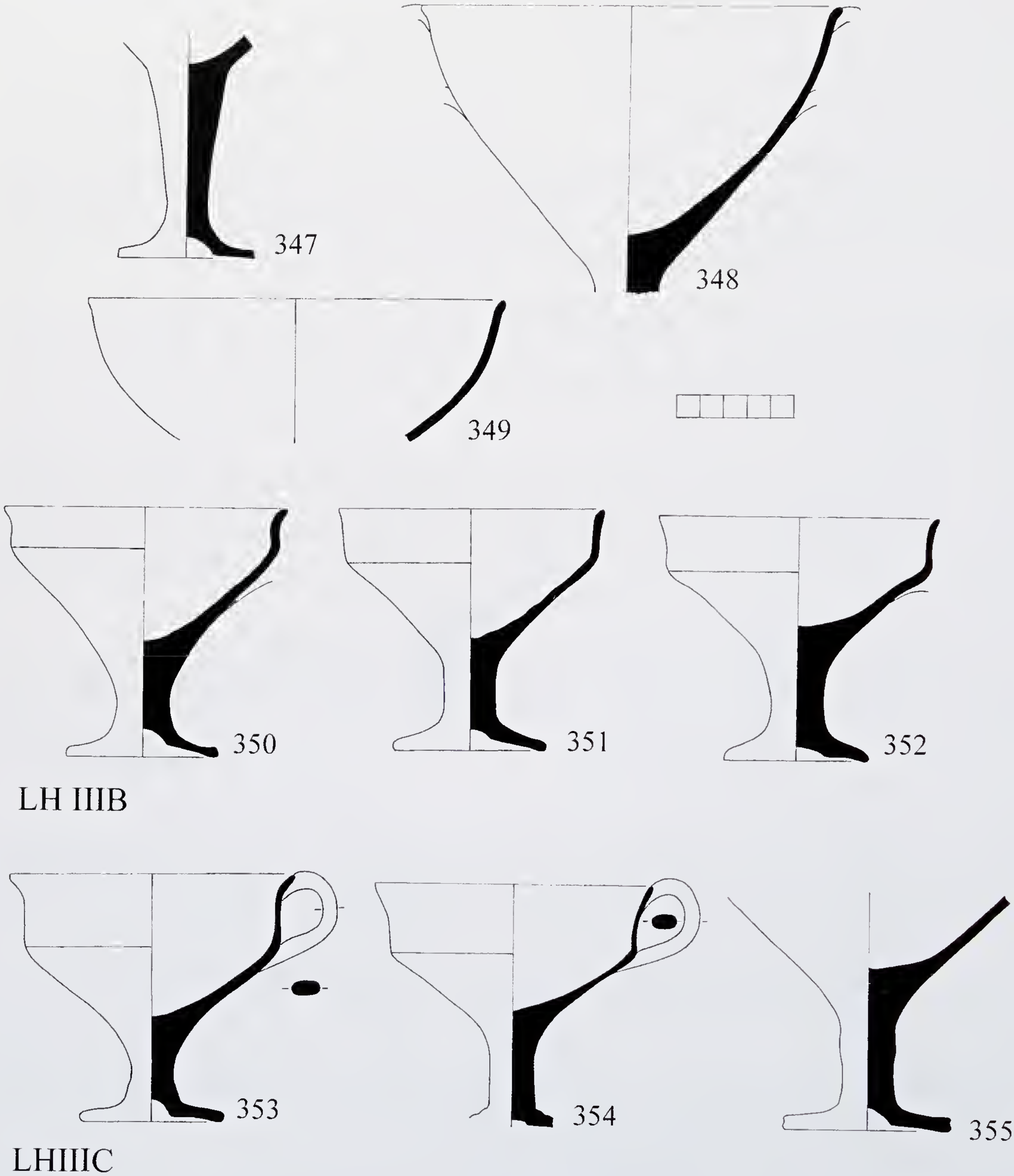

FIG. 25. LH IIIB: **347–49** rounded kylix, **350–52** carinated kylix; LH IIIC: **353–54** carinated kylix, **355** conical kylix.

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X-RADIOGRAPHY OF KNOSSIAN BRONZE AGE VESSELS: ASSESSING OUR KNOWLEDGE OF PRIMARY FORMING TECHNIQUES[1]

History of Radiography of Cultural Materials

When Wilhelm Röntgen discovered X-rays in 1895, this opened up a new way for people to 'look through things' (Röntgen 1896). While the first published images demonstrated the technique's potential for medical uses, X-rays of Peruvian and Egyptian mummies soon established its potential also for archaeological applications (Culin 1896; Petrie 1898). However, it was only in the 1930s that archaeologists began to employ X-rays for artefacts. Since then, X-radiography has become a tried and tested tool for the investigation of paintings, metals, ceramics, textiles, stone, and paper objects as well as geoarchaeological applications to soils and sediments (for a useful summary, see Lang and Middleton 2005). Among the most common uses of X-radiography of cultural materials are: (1) identification of the object and its condition; (2) identification of manufacturing method(s); (3) identification of material(s); (4) identification of joins, faults, breaks, repairs and reuse; (5) identification of finishing methods and decoration; (6) identification of forgeries. Given its range of applications, X-radiography has become a particularly valued tool among museum and gallery conservators (Gilardoni 1994; Graham and Eddie 1985; Lang and Middleton 2005). More recently, scholars and practitioners have been exploring the potential of other radiological techniques, such as stereoradiography, computer-assisted tomography (CAT) and microfocus radiography; their application to cultural material, especially regarding the study of mummies, is expanding rapidly (Halmshaw 1995; Vandiver *et al.* 1991; Lang *et al.* 2005).

History of Radiography of Ceramics

The earliest application of X-radiography to ceramics is the radiograph of seven sherds from North American Indian burials published by Titterington (1935) in order to illustrate differential proportions of inclusions. A decade later, Digby (1948) employed the technique to investigate a defect in the construction of a Peruvian stirrup-handled pot. Van Beek (1969) was the first to use X-radiography to investigate forming techniques. However, it was only in 1977, with the publication of a seminal paper by Rye (1977; cf. 1981), that the potential of X-radiography for ceramics was fully appreciated. Although it is only now, with a better appreciation of the power of imaging software programmes, that X-radiographic research into ceramics is gaining momentum (O'Connor and Maher 2001; O'Connor *et al.* 2002).

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Characterization of clay fabrics through inclusion or tempers and identification of manufacturing techniques are the two main topics of investigation. The former has been dealt with in some detail elsewhere (Berg 2008). The latter will form the main focus of this paper (for general summaries, see Carr 1990; Middleton 2005).

IDENTIFYING VESSEL FORMATION PROCEDURES

Since its first application, X-radiography has established itself as a powerful technique for the identification of primary forming methods—in particular, pinching, drawing, coil-building, slab-building, moulding and wheel-throwing. It was Rye who first recognized that 'the application of pressure to plastic clay causes mineral particles, voids and organic fragments to take up a preferred orientation' which will affect the whole clay body (FIG. 1). The resulting alignment and distribution of inclusions (as well as shape and orientation of voids) is characteristic of each forming method and will not normally be obliterated by secondary forming or decoration procedures (Rye 1977, 206). Pinching can be recognized by an alignment of inclusions parallel to the surface, but without a recognizable horizontal or vertical orientation. Drawing orients inclusions weakly vertically when viewed in cross-section, and voids appear flattened and circular when viewed normally. Coiling results in a preferred horizontal orientation of inclusions and elongated, horizontal voids. Inclusions aligned parallel to the surface, but without a predominant orientation, is a characteristic pattern of slab-building. Moulding produces a parallel, but random alignment to the surface. Lastly, inclusions aligned parallel to the surface, but set at a diagonal orientation when seen from the front are characteristic of wheel-thrown pots (Rye 1981). Coil, slab, or section joins, especially when not obliterated fully by secondary techniques, can provide additional clues for the identification when elongated voids between the two joining parts are visible on the X-radiograph (Glanzman 1983). Many scholars have employed radiography successfully (Carmichael 1990; 1998; Ellingson *et al.* 1988; Foster 1983; Henrickson 1991; Levi 1999; Magrill and Middleton 2004; Nenk and Walker 1991; Philpotts and Wilson 1994; van Beek 1969; Vandiver *et al.* 1991; Vandiver and Tumosa 1995), but the two most detailed case studies were undertaken by scholars working in the Near East. In their diachronic study of Baq'ah pottery, Glanzman and Fleming were able to show that, contrary to the common assumption of an evolutionary sequence from hand-building techniques to the potter's wheel, the Baq'ah LB I wheel-throwing tradition was replaced by a coil-building one in the LB II and Iron I A periods (Glanzman and Fleming 1986; see also Glanzman 1983). Meanwhile, Vandiver employed radiography to reconstruct one specific forming technique, namely sequential slab-building, in the Zagros region of modern-day Iran (1987; 1988). Some of the most intriguing case studies utilizing X-radiography revolve around the detection of hidden vessel parts and added sections, such as the whistling mechanism in Peruvian pots and the fake spout of Aegean stirrup jars (Digby 1948; Leonard *et al.* 1993).

Secondary forming techniques (such as scraping, trimming, and turning) and surface treatments are almost impossible to verify radiographically, because they do not generally involve severe modification of the clay that would be reflected in an X-radiograph (Berg 2008). They are therefore best identified visually. The exception is the paddle and anvil technique, which applies such considerable pressure to the shape that it can obliterate all radiographically visible attributes of the primary forming technique. As a consequence, even when all visible paddle marks have been removed from the vessel surfaces, it may still be

possible to identify the technique by its characteristic pattern of inclusions with a laminar appearance and oriented parallel to the surface; sometimes one can also detect distinctive star-shaped cracks around the larger mineral inclusions (Rye 1981).

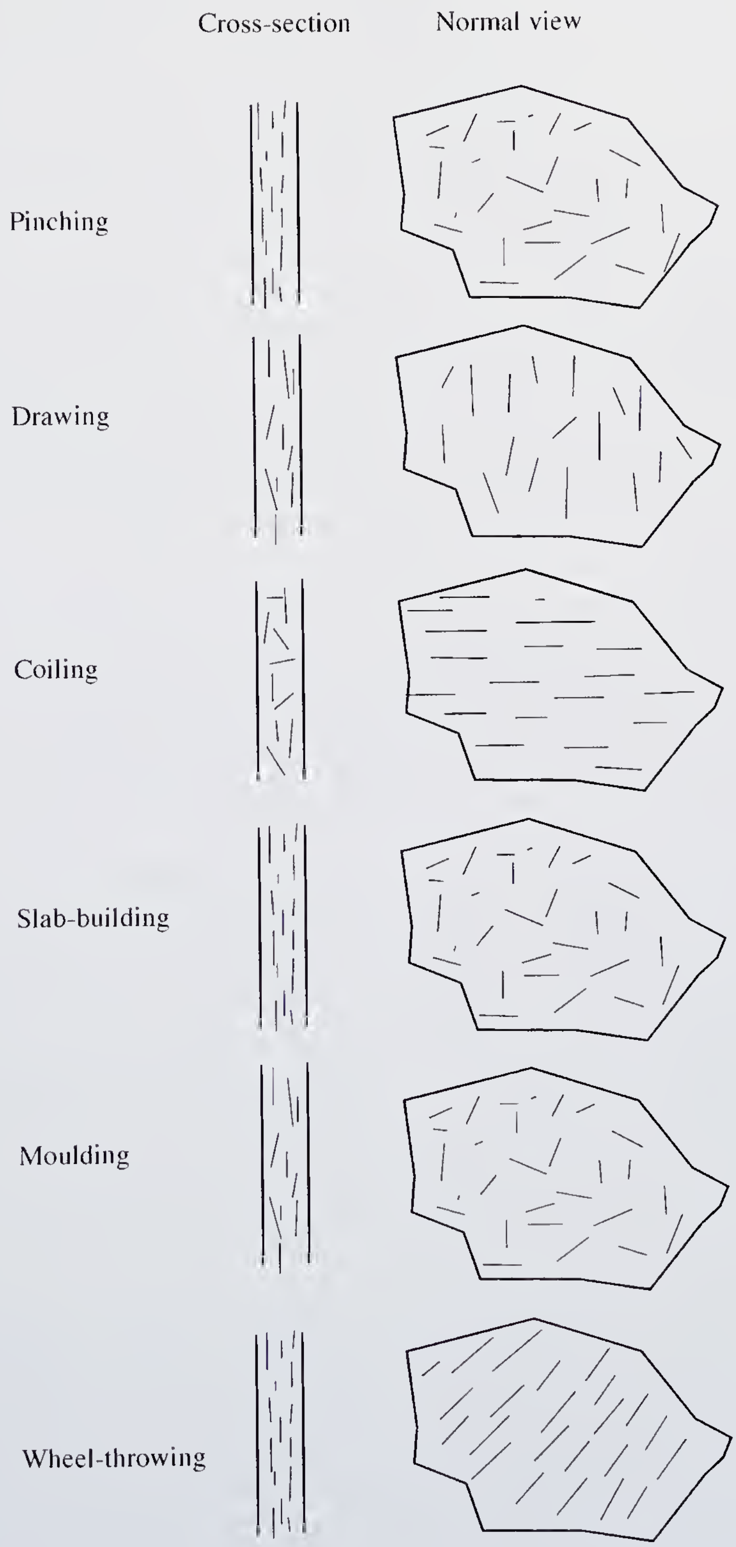

FIG. 1. Characteristic features of the main pottery forming techniques (after Carr 1990, fig. 1; Rye 1981; Middleton 1995, fig. 4. 8).

Radiographic Case Studies Applied to Greek Bronze Age Ceramics

So far, radiographic techniques have not been widely employed in Aegean pottery studies. Analysis of East Cretan Dark-on-White Ware and LH III Mycenaean stirrup jars present the only published applications of this technique to Greek Bronze Age pottery known to the author. In both cases, the investigators had to rely on museum's pieces (Museum of Pennsylvania and the British Museum, respectively: see Johnston and Betancourt 1984; Leonard *et al.* 1993). The only example of a study undertaken in Greece is provided by a collection of fifth-century BC Punic amphorae from Corinth (Maniatis *et al.* 1984). All three case studies are examples of highly informative interdisciplinary projects which employed radiography in combination with physico-chemical analyses, visual inspection, and replication studies to investigate the forming technique and fabric composition in relation to a distinct ceramic ware or vessel shape. For example, Johnston and Betancourt (1984) established that East Cretan White-on-Dark ware pots were built up from strips and that their clay preparation was irregular. Leonard *et al.* (1993) were able to document two different ways of making stirrup jars, while Maniatis *et al.* (1984) demonstrated radiography's ability to assign individual vessels to two different fabrics. Despite its acknowledged potential, no projects have since applied the technique to ceramic material located in Greece.

Radiography: Theory, Methods, and Ceramic Analysis

A wide range of excellent specialist books is available on industrial and medical radiology which will provide the inquisitive reader with information on all theoretical and practical aspects of the technology (Halmshaw 1995; for literature targeted at an archaeological audience, see Carr and Riddick 1990; Lang and Middleton 2005). Here, I shall limit myself to a brief overview.

To put it simply, X-radiography is a type of electromagnetic radiation that penetrates objects in proportion to the atomic density of the materials and thickness of the object, and captures the outgoing radiation as a greyscale image on a photographic film or monitor. Results can be modified by adjusting a wide range of variables, including type of film, strength of the current, tube voltage, exposure time, positioning of the object as well as the addition of filters or screens. Once developed, the resulting image can then be scrutinized under a strong light and archived. If not already captured directly in digital format, bespoke radiographic scanners permit rapid digitization and subsequent archival storage (O'Connor and Maher 2001). Once digitized, advanced filters and edge detection kernels available for imaging software programmes can be applied to bring out even small details (O'Connor *et al.* 2002; Lang *et al.* 2005).

The advantages inherent in radiography make it a formidable analytical tool for ceramic specialists: (1) it is a non-destructive technique; (2) it permits investigation of sherds *and* complete vessel; (3) it can be done comparatively rapidly and cheaply; and (4) suitable medical or industrial facilities are available in many places. As a consequence, radiography has established itself as an apt complementary technique for conventional destructive and small-scale provenance analysis (Blakely *et al.* 1989; Maniatis *et al.* 1984). However, its greatest advantage lies in its ability to complement visual inspection. Up to now, pottery specialists have relied on traces of the potting process on the vessels themselves to make judgements about the forming technique(s), which sometimes are inaccurate. Based on the existence of

rilling around the interior and/or exterior, concentric striations on the base and compression ripples around the neck, for example, pottery specialists profess to be able to distinguish handmade from wheelmade vessels macroscopically (Courty and Roux 1995; see also Pierret *et al.* 1996 for quantitative procedures). However, even specialists acknowledge that these features may be associated with other techniques besides wheel-throwing, particularly those involving the wheel as a secondary procedure (Roux and Courty 1998). Concentric striations on vessels bases are not exclusively associated with wheel-made production, as they merely indicate the use of a rotational movement at the time of removing the vessel from the bat. Likewise, ripples on the inner vessel walls only occur in the final stage of shaping a pot and are thus not necessarily related to the primary forming. Owing to the polysemic nature of these features and the obliteration of primary forming techniques by secondary ones, only radiographic techniques (as well as destructive and partial thin-section analysis) can safely distinguish between wheel-throwing and wheel-coiling (Berg 2008; Henrickson 1991; Roux and Courty 1998; Courty and Roux 1995), while visual observations are more suited to identifying secondary procedures.

While the last thirty years have seen much advancement in the technical aspects of the technique as well as analytical procedures and practices, X-radiography has some limitations which need to be borne in mind and relate both to the technology itself and ancient potting practices. Technological limitations concern the quality of the film and our inability to distinguish visually between materials with a similar radio-density. Likewise, ancient potting practices can make interpretation difficult, especially when the clays are so refined that they lack large inclusions or when they are so packed with temper that they impede visibility. Additional difficulties can be encountered when secondary forming techniques are so invasive that they obliterate traces of primary methods completely or when primary forming techniques (especially coiling) are so masterly executed that they leave no radiographically visible features. These drawbacks can sometimes be overcome by the use of 'thick sections' pioneered by Glanzman (1983) and Vandiver (1987; 1988) whereby a complete vertical profile is cut off the vessel and the cross-section X-rayed. Coil or slab joins as well as inclusion alignments are more clearly visible, but this procedure will of course result in larger-scale destruction of the ancient vessel. Experiments show that an average identification success rate of around 60–70% can be expected, as regards conventional X-radiography.

Methodology

Altogether, ninety-five open and closed coarse, semicoarse and fine EM III through to LM II vessels stored in the Stratigraphical Museum at Knossos were selected for analysis. In addition to comparative ease of accessibility, temporal coverage and sufficiently large sample size, Knossian material was chosen for the following reasons: first, to establish the viability of using X-radiography on Cretan material. Second, to demonstrate the feasibility of undertaking such work in-house on Crete itself.[2] Third, with most of the previous work conducted on the finer wares, it was important to investigate the technique's potential for all fabrics, including fine, semicoarse and coarse pottery. Fourth, to investigate further the technique of wheel-coiling

[2] Subsequent to the completion of this project, the X-ray machine was purchased by the INSTAP Study Centre for East Crete, and this now provides an easily accessible means of undertaking high-quality industrial X-radiography on the island itself.

(i.e. coil-building a vessel whose walls are subsequently evened out on a slowly revolving turning device) as practised at Knossos and establish its temporal progression (for wheel-coiling, see Berg 2008; Roux and Courty 1998; Courty and Roux 1995; for different forming techniques on Crete, see Knappett 1999; 2004; Poursat and Knappett 2005; MacGillivray 1998; 2007). Fifth, to explore the existence of combination vessels (i.e. vessels where different sections have been made using different primary forming techniques) as suggested by the X-ray analysis of vessels from the British Museum collection (Berg and Ambers forthcoming). Finally, and most importantly, to offer additional evidence on the nature of the adoption of the potter's wheel from MM I B onwards.[3]

Most vessels are fragmentary; the few complete vessels primarily consist of cups. Wherever possible, a representative cross-section of different open and closed vessel types was chosen, although the Late Bronze Age remains underrepresented. Many of the vessels are unpainted or have simple monochrome decoration. Many are made of coarse clays; however, a deliberate effort was made to include also semicoarse and finer fabrics to assess their suitability for X-radiography.

X-radiography took place at the Stratigraphical Museum at Knossos using a Faxitron single cabinet X-ray unit with a 0.5 mm focal spot at 60 cm source-object distance and at 3 mA. The X-ray film used was an industrial Agfa D4 film. Films were developed manually using an Agfa G128 Developer and Agfa G328 Fixer. Digitization of the images took place at the University of Bradford using their Agfa FS50B industrial radiographic film scanner. The images were stored as 12-bit TIFF and lossless JPEG files. Advanced filters and edge detection kernels available for imaging software programmes were applied to make minute details even more visible.

Catalogue Information

As originally established by Rye (1977; 1981) specific primary forming methods can be confidently identified using X-radiography because each method imprints its own specific signature onto the clay structure. To give the reader sufficient information to reproduce and reassess the decision making process that led to the identification of a specific forming technique, each catalogue entry summarizes the most relevant information: wall thickness and regularity; void/fissure quantity, size, shape, and orientation; inclusion quantity, size, shape, and orientation; coil seam visibility and size. Colour changes on the X-ray are a direct indicator of changes in wall thickness as thicker walls are represented by lighter colours, and thin walls are characterized by darker colours. Changes in wall thickness can provide circumstantial evidence for forming techniques as wheel-thrown pots get gradually thinner towards the rim, while handmade ones can retain the same thickness throughout. Horizontal or vertical irregularity of wall thickness—again visible through colour changes on the X-ray—can provide circumstantial evidence of specific forming techniques, such as pinching, drawing, beating, and coiling. Void/fissure orientation is essential to establishing forming technique; their quantity and size can serve as indicators of the amount of water added during the manufacturing process; appreciation of their shape can help distinguish between voids caused

[3] An article in preparation will deal exclusively with this issue.

through coil building and voids created by applying rotative kinetic energy. Inclusion orientation is essential for identifying primary forming techniques, whereas recording quantity, size, and shape of inclusions helps assess the overall visibility contrast between clay matrix and particles (Berg 2008). Coil seams can be identified either by not fully obliterated voids or by layers of horizontal inclusions where two coils meet. Where possible, the size of individual coils is measured, but, if visibility is poor, intermediate coils might be missed out; where this is suspected, no height is provided. Each entry concludes by contrasting the identification of the vessel's *primary* forming technique based on macroscopic observation (carried out prior to radiography) and that derived from radiographically visible features. Secondary forming techniques are not discussed any further as they do not leave distinct radiographic signatures. An exception is made with regard to wheel-coiling. This is the use of a rotating potting device, which does not reach speeds high enough to develop rotative kinetic energy to pull up a vessel; instead it is merely used to join, thin, or smooth the walls that have been built using a handmade technique. 'Wheel-thrown', on the other hand, denotes vessels made on a fast rotating device which developed rotative kinetic energy to pull the vessel wall up; 'coiled' refers to vessels built up by placing coils on top of each other; 'drawing' identifies vessels where the walls were pulled up vertically with the fingers. 'Pinching' denotes a vessel which has been made by squeezing the clay between the fingers. Having been based on experimental data from modern control groups, the reliability of the identification is extremely high; in about 70% of cases the forming technique can be established with the greatest confidence. The remainder of the vessels did not leave enough visible traces for a confident determination of the technique: where it is clear that vessels were not made using a fast-spinning device, but where the precise primary forming technique is impossible to identify, the term 'handmade' has been used. Vessels that cannot be clearly identified as having been wheel-thrown or handmade are classified as 'uncertain'. 'IB' refers to the author's original cataloguing system.

A Guide to Interpreting X-Radiographs

To demonstrate how one progresses from image to interpretation, two brief case studies from the catalogue are presented here to explain the meaning of the main features.

As outlined above, the main features to consider in the interpretation of any X-ray in relation to primary forming techniques are: wall thickness and regularity; shape, orientation and abundance of any voids; existence and spacing of coil seams; and the orientation of inclusions.

WHEEL-THROWN

In relation to **16**, a carinated cup, we can observe the following (PLATE 9): the colour change from a relatively white base (indicating less penetration of X-rays and hence a thicker wall) to a darker rim (indicating greater penetration of X-rays and hence a thinner wall) demonstrates that the wall is getting progressively thinner from the base towards the rim. While this does not speak against a handmade vessel, it is a natural and inevitable feature of wheel-thrown pots using a single lump of clay. This is because the lower part needs to be stronger in order to support the upper part—equal wall thickness would most likely lead to the collapse of the vessel. The regular rilling along the vertical axis can also be achieved using the wheel-coiling

technique, but is commonly associated with wheel-thrown vessels. The rilling is visible on the X-ray through the changing wall thickness whereby whiter and darker areas alternate. Black gaps (indicating very thin layers of clay or no clay) in vessel wall are voids. These voids are a consequence of kneading the clay (the more thorough the kneading, the small and fewer the voids), the amount of water used in throwing the pot (the more water, the more voids) and the stresses exerted by potter onto the pot during the throwing process. Elongated voids indicate that the clay was compressed with one hand either side of the wall and then lifted up. As lifting is done while the vessel is turning, the lift occurs in a diagonal direction. This is mirrored in the diagonal orientation of the voids and is a clear indicator for wheel-throwing. Theoretically, the angle of the elongated voids could provide information about the speed of the manufacture (the steeper the angle, the faster), but in reality, the manufacturing process is too complex for a direct equation (Berg 2008). Inclusions can incorporate a wide range of materials and, depending on the material and its atomic density, might be seen clearly against the clay background (if they are considerably less or more dense than the clay) or blend in perfectly (if they have a similar density to the clay) (Berg 2008). While there is a tendency for wheel-thrown vessels to have smaller and fewer inclusions, the size, frequency, sorting, or type of inclusions do not within themselves provide a guide to forming technique. However, when inclusions are elongated they can, just like voids, indicate direction of pressure (e.g. diagonal for wheel-throwing). In this pot, most of the inclusions are rounded and thus cannot provide further information on the forming technique.

COILED

The X-ray of **18**, a jug with cut-away spout, shows characteristics typical of a coiled vessel (PLATE 9): unlike wheel-thrown pots which progressively get thinner towards the rim, handmade vessels can have multiple wall thickness changes. Here the vertical colour change from white (base) to black (body) to white (shoulder) and back to black (neck) indicates that the wall is getting thinner from base to below the shoulder and then thickens drastically in the shoulder section and gets thinner again for the neck. In addition, the colour variations along the horizontal axis at the height of the widest diameter shows that fingers had applied pressure unevenly—a typical occurrence in handmade vessels. Voids are abundant, which indicates that kneading was not as thorough as it could have been, possibly owing to the many large inclusions; they are short to medium in dimensions, reflecting the lack of water and the fewer stresses exerted by the potter during the making of this pot; they are elongated in shape, which is characteristic of coil-manufacture as can be seen in modern X-ray experiments (Berg 2008).

Most telling, however, is their orientation. The same experiments have demonstrated that the making of coils will invariably result in a horizontal alignment of the voids (and/or inclusions) when viewed frontally on an X-ray—as is the case here. Voids become particularly meaningful when they are the result of air trapped between two overlaid coils. In those instances, we can identify the actual coil seams. Here, five coil seams can be recognized. The closest distance between the seams is 1.5 cm. As coils are unlikely to be thinner than 1 cm for practical reasons, we can assume that the measurement of 1.5 cm provides us with the height of the coils once added to the vessel. The inclusions are moderate in amounts and show very poor sorting as they range from small to very large ones. While inclusion size is by no means a fail-safe indicator of manufacturing technique, the use of large and very large inclusions is

more common in handmade vessels as they would be too rough on the potter's hands when wheel-throwing and could potentially damage the whole structure of the wheel-thrown vessel when dragged along by the fingers. Most of the inclusions are rounded and thus lack an indicative orientation. However, they can be of some help when considered in conjunction with the voids: when coils are rolled out and placed on top of each other, inclusions that have been pushed to the outside will be lodged against each other, thus creating a double layer of inclusions that follows along the seam and can be visible on the X-ray as in this case. Frequently, this double layer can be seen in conjunction with voids trapped between the two coils and thus provides another signpost for the identification of coil seams.

WHEEL-COILED

While wheel-coiled vessels may appear wheel-thrown macroscopically due to the existence of rilling, the forming techniques are fundamentally different. Wheel-coiled vessels utilize the coiling method as primary forming technique, subsequently followed by spinning on the wheel as a secondary forming technique. Wheel-coiled vessels are spun either at speeds not high enough to develop rotative kinetic energy (RKE) and the wheel is merely used to join, thin or smooth the walls that have been built using a handmade technique, or they are spun at speeds sufficient to develop RKE, but this is not taken advantage of. Experiments undertaken by Roux and Courty have identified four different methods of wheel-coiling (then called 'wheel-shaping') depending on the stage within the production process during which RKE is applied, with Method 4 using the wheel most forcefully (1998; also Courty and Roux 1995). They concluded that all methods can potentially be distinguished by characteristic features detectable through visual inspection and optical microscopy. As demonstrated through experiments elsewhere (Berg 2008), X-radiography is a reliable method to distinguish between the two forming techniques as it investigates the primary forming. Thus, unlike wheel-thrown pots which have characteristic diagonal alignment of inclusions and voids, wheel-coiled vessels (Roux and Courty's Methods 1 and 2) will have a horizontal one indicative of coiling as the primary forming technique. Recent analysis of X-ray films of Method 4 wheel-coiled vessels undertaken by the author shows a mixture of firmly horizontal and very lightly angled inclusions and void orientation. In all cases, wheel-coiled vessels could always be firmly identified as such using X-radiography; they cannot be confused with the wheel-throwing technique.

Thus wheel-coiled vessels can be identified by a mismatch between the X-ray image and macroscopic observations: the X-ray image will show the presence of coil seams and/or a horizontal orientation of inclusions and voids indicative of the primary forming (see above, 'coiling', for details). In contrast, observation by eye will normally show strong rilling indicative of subsequent shaping on the wheel. An example of a wheel-coiled vessel is **92**. The X-ray of this vessel shows several horizontal coil seams, but the observed rilling on the interior and exterior appears to indicate wheel-throwing.

COMBINATION TECHNIQUES

As an X-ray of a Middle Minoan amphora in the British Museum has shown (lower third wheel-thrown; middle third coiled and drawn; upper third coiled), not all potters use the same forming technique throughout the whole vessel profile (Berg and Ambers forthcoming). Instead, pots might be made in different stages, by different techniques, and

possibly even made by different potters with different levels of expertise. Thus, 'combination techniques' indicate the existence of at least two different primary forming techniques along one vessel profile. Few confirmed (**1**, **68**) or potential (**13**, **17**, **59**, **67**, **76**) 'combination techniques' vessels have come to light in the sample X-rayed.

Catalogue

EM III/MM I A

1 Rounded cup (PLATE 10) (IB 89)
Rim-to-base fragment; handle missing. H. 6.4 cm.
'Floor deposit' of House A.
Momigliano 1991, 216–20 n. 10, fig. 20, pl. 42.
Wall: uneven thickness; punctuated irregularities along vertical and horizontal axes.
Voids/fissures: abundant in quantity; medium to large in dimensions; elongated and irregular shapes; horizontal (body) and diagonal (base) orientation.
Inclusions: moderate in quantity; small to medium in dimensions; elongated and rounded shapes; preferential horizontal orientation.
Coil seams: none visible.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): handmade [with subsequent shaping on wheel].
Forming technique (X-ray): base: wheel-thrown, body: wheel-coiled and drawn, rim: wheel-coiled.

2 Footed goblet (PLATE 10) (IB 83)
Rim-to-base fragment. H. 9 cm.
Upper East Well.
Momigliano 1991, 155–63 n. 2, fig. 1, pl. 19.
Wall: thinning towards rim; patchy irregularities along vertical and horizontal axes.
Voids/fissures: abundant in quantity; small to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; medium to large in dimensions; predominantly rounded shapes; no orientation.
Coil seams: 4 probable.
Coil height: 1 cm.
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

3 Footless goblet (PLATE 10) (IB 88)
Chipped rim. H. 7.9 cm.
'Floor deposit' of House A.
Momigliano 1991, 216–20 n. 7, fig. 20, pl. 42.
Wall: except for thick base, similar thickness throughout; no irregularities.
Voids/fissures: abundant in quantity, short to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; small to large in dimensions; mainly rounded shapes; no orientation.
Coil seams: 2.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): secondary knife trimming has obliterated all traces of primary forming.
Forming technique (X-ray): coiled [with subsequent knife-trimming].

4 Flaring bowl (PLATE 10) (IB 92)
Rim-to-base fragment. H. 5.8 cm.
House A.
Momigliano 1991, 216–20, vessel not illustrated.
Wall: similar thickness throughout; few irregularities.
Voids/fissures: virtually non-existent.
Inclusions: abundant in quantity; medium in dimensions; mainly rounded and some oval shapes; no recognizable orientation.
Coil seams: none.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): coiled?
Forming technique (X-ray): handmade?

5 Flaring bowl (PLATE 10) (IB 84)
Two joining rim-to-base fragments. H. 8.3 cm.
House A.
Momigliano 1991, 216–20, vessel not illustrated.
Wall: thick base and rim, thinner body; some irregularities along horizontal axis.
Voids/fissures: rare in quantity; small in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and rectangular shapes; rectangular ones have preferential horizontal orientation.
Coil seams: none.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

6 Beaked jug (PLATE 11) (IB 96)
23 joined and partially restored rim-to-body fragments with handle, spout missing; H. 19.9 cm.
Pit Repository.
Momigliano 2000, no. 54, fig. 12, pl. 20 *c*.
Wall: getting thinner towards widest diameter, thicker up to neck/shoulder joint, neck thin; few irregularities.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and elongated shape; elongated ones have horizontal orientation.
Coil seams: 2 (shoulder).
Coil height: 1.0 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

7 Spouted jar (PLATE 10) (IB 87)
Rim to upper body fragment with damaged spout; H. 13.5 cm.
Upper East Well.
Momigliano 1991, 155–63, vessel not illustrated.
Wall: same thickness throughout except for thick rim; patchy irregularities along horizontal and vertical axes.
Voids/fissures: moderate in quantity; small to medium in dimensions; irregular shape; no orientation.
Inclusions: abundant in quantity; large in dimensions; predominantly rounded in shape; some elongated ones; no orientation.
Coil seams: 1.0 (rim).
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): coiled.
Forming technique (X-ray): handmade.

8 Spouted jar (PLATE 11) (IB 85)
6 joined shoulder-to-body fragments, spout missing; H. 19.9 cm.
Upper East Well.
Momigliano 1991, 153–63, vessel not illustrated.
Wall: same thickness throughout except for thicker rim; irregularities along horizontal and vertical axes.
Voids/fissures: moderate in quantity; small to medium in dimensions; irregular shape; no orientation.
Inclusions: abundant in quantity; large in dimensions; predominantly rounded shape; no orientation.
Coil seams: none.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): coiled.
Forming technique (X-ray): handmade.

9 Side-spouted jar (PLATE 11) (IB 86)
Rim-to-base fragment with spout, handle missing; H. 7 cm.
Upper East Well.
Momigliano 1991, 155–63 n. 39, pl. 21.
Wall: getting thinner towards rim; elongated patches of irregularities on lower body along horizontal axis, undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; short to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; small to medium in dimensions; predominantly rounded in shape; no orientation.
Coil seams: 3.
Coil height: 1.3–1.4 cm.
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

10 Cooking vessel (PLATE 11) (IB 91)
2 joined base and lower body fragments; H. 8.9 cm.
House A.
Momigliano 1991, 216–20, vessel not illustrated.
Wall: consistent thickness throughout except for base region; some irregularities along horizontal axis.
Voids/fissures: rare in quantity; short in dimensions; elongated shape; preferential horizontal orientation, though also some patches with vertical orientation.
Inclusions: abundant in quantity; small to very large in dimensions; rounded and elongated shapes; elongated ones have preferred horizontal orientation.
Coil seams: 2.
Coil height: 2.0 cm.
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

11 Closed vessel (PLATE 11) (IB 90)
4 joined base and lower body fragments; H. 5.4 cm.
House A.
Momigliano 1991, 216–20, vessel not illustrated.
Wall: similar thickness throughout; light patchy irregularities along horizontal and vertical axis.
Voids/fissures: abundant in quantity; medium in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; small to medium in dimensions; rounded shape; no orientation.
Coil seams: 1.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

MM I B

12 Saucer (PLATE 11) (IB 95)
Rim-to-base fragment; H. 2.9 cm.
South Front of Palace.
Momigliano and Wilson 1996, P 31, fig. 10.
Wall: regular undulating changes in thickness from base to rim.
Voids/fissures: moderate in quantity; large in dimensions; elongated shape; diagonal orientation.
Inclusions: moderate in quantity; small to large in dimensions; rounded to oval shape; oval ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheelmade.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

13 Rounded cup (PLATE 11) (IB 94)
Rim and body fragment, with handle attachments; H. 6.4 cm.
South Front of Palace.
Momigliano and Wilson 1996, P 41, fig. 10.
Wall: getting thinner towards rim; round patchy irregularities along vertical and horizontal axes.
Voids/fissures: abundant in quantity; medium in dimensions; elongated shape; horizontal orientation in upper 1/3, preferential horizontal orientation in lower 2/3.
Inclusions: rare in quantity; small in dimensions; rounded shape; no orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): top 1/3 coiled; bottom 2/3 handmade.

14 Straight-sided cup (PLATE 11) (IB 59)
Complete except for chipped rim; H. 5.7 cm.
Early Chamber beneath West Court.
MacGillivray 1998, K 299, SMP 9558, pls. 1, 33.
Wall: getting thinner towards rim; some irregularities along vertical axis.
Voids/fissures: abundant in quantity; short to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to very large in dimensions; rounded and elongated shapes; elongated ones have horizontal orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): handmade.

Forming technique (visual): handmade [with subsequent knife-trimming and shaping on wheel].
Forming technique (X-ray): wheel-coiled [with subsequent knife-trimming].

15 Straight-sided cup (PLATE 12) (IB 66)
Joined from 3 fragments and restored in plaster; H. 8.4 cm.
Early Chamber beneath West Court.
MacGillivray 1998, K 279, SMP 9619, pl. 40.
Wall: getting thinner towards rim; regular undulating along vertical axis, some irregularities just above base.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated in shape; horizontal orientation.
Inclusions: rare in quantity; small in dimensions; rounded in shape; no orientation.
Coil seams: 4.
Coil height: 1.0 cm.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): wheel-thrown or wheel-coiled.
Forming technique (X-ray): wheel-coiled.

16 Carinated cup (PLATE 12) (IB58)
2 joined rim-to-base fragments with handle, partially restored in plaster; H. 7.4 cm.
Early Chamber beneath West Court.
MacGillivray 1998, K 243, SMP 9631, pls. 3, 41.
Wall: getting thinner towards rim; regular undulating along vertical axis.
Voids/fissures: abundant in quantity; medium to long in dimensions; elongated shape; diagonal orientation.
Inclusions: rare in quantity; medium in dimensions; rounded shape; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

17 Footed goblet (PLATE 12) (IB 93)
Rim-to-base fragment; H. 7.9 cm.
South Front of Palace.
Momigliano and Wilson 1996, P 33, fig. 10, pl. 5.
Wall: getting thinner towards rim; major irregularities around base.
Voids/fissures: abundant in quantity; small to medium in dimensions; shape crack-like; orientation vertical (and some diagonal) in lower 2/3, horizontal in upper 1/3.
Inclusions: abundant in quantity; small to large in dimensions; square to elongated shape; orientation vertical in lower 2/3, horizontal in upper 1/3.
Coil seams: ?
Coil height: ?
Forming technique (original publication): wheelmade.
Forming technique (visual): handmade [with subsequent light shaping on wheel].
Forming technique (X-ray): lower 2/3 drawn, upper 1/3 wheel-coiled.

18 Jug with cut-away spout (PLATE 12) (IB 60)
Almost complete, part of handle restored in plaster; H. 11.6 cm.
Early Chamber beneath West Court.
MacGillivray 1998, K 331, SMP 9589, pls. 1, 37.
Wall: getting thinner from base to shoulder, shoulder and neck considerably thicker; patchy irregularities around area of widest diameter.
Voids/fissures: abundant in quantity; short to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; small to very large in dimensions; rounded shape; no orientation.
Coil seams: 5.
Coil height: 1.5 cm.
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

19 Carinated bridge-spouted jar (PLATE 12) (IB 65)
Rim-to-base fragment with spout and one handle; H. 10.5 cm.
Early Chamber beneath West Court.
MacGillivray 1998, K 359, SMP 9581, pl. 35.
Wall: except for thick base, similar thickness throughout; irregularities along horizontal and vertical axes.
Voids/fissures: abundant in quantity; short to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; predominantly rounded shape, few elongated ones; elongated ones have horizontal orientation.

Coil seams: 3.
Coil height: 1.5 cm.
Forming technique (original publication): handmade.
Forming technique (visual): wheel-coiled [with subsequent light knife-trimming].
Forming technique (X-ray): wheel-coiled [with subsequent light knife-trimming].

20 Carinated bridge-spouted jar (PLATE 12) (IB 57)
Largely complete except for chipped spout and rim, handles missing; H. 9.9 cm.
Royal Pottery Stores, Small East Room.
MacGillivray 1998, K 861, SMP 9710, pl. 118.
Wall: getting thinner from base to carination, relatively even thickness above, rim itself thin; square irregular patches along horizontal axis at carination.
Voids/fissures: abundant in quantity; small to large in dimensions; elongated shape; horizontal orientation.
Inclusions: rare in quantity; small in dimensions; rounded and elongated shapes; no orientation.
Coil seams: 5.
Coil height: 1.5–2 cm.
Forming technique (original publication): handmade.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

21 Three-handled jar (PLATE 12) (IB 62)
Joined from 4 fragments, rim missing, one handle broken; H. 11.6.
Early Chamber beneath West Court.
MacGillivray 1998, K 334, SMP 9656, pl. 45.
Wall: getting thinner towards upper body, shoulder to rim thicker; irregularities along vertical axis.
Voids/fissures: moderate in quantity; short to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: rare in quantity; small to medium in dimensions; rounded shape; no orientation.
Coil seams: 2.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

22 Spouted jar (PLATE 13, bottom and top displayed separately) (IB 61)
Almost complete except for parts of rim and spout, joined from many fragments; H. 24 cm.
Early Chamber beneath West Court.
MacGillivray 1998, K 363, SMP 9666, pl. 47.
Wall: similar thickness throughout; irregularities along horizontal axis.
Voids/fissures: moderate in quantity; small and large in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; mainly rounded and some elongated shapes; elongated ones have horizontal orientation.
Coil seams: 6.
Coil height: 1.5 cm.
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

23 Lamp (PLATE 13) (IB 63)
Largely complete, part of rim and handle missing; H. 3.0 cm.
Early Chamber beneath West Court.
MacGillivray 1998, K 356, SML 955, pl. 47.
Wall: even thickness throughout; undulating irregularities along vertical axis.
Voids/fissures: moderate in quantity; short to medium in dimensions; elongated shape; diagonal orientation.
Inclusions: rare in quantity; medium to very large dimensions; rounded shape; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

24 Pyxis (PLATE 13) (IB 64)
19 joined rim-to-base fragments, gaps restored in plaster; H. 9.7 cm.
Early Chamber beneath West Court.
MacGillivray 1998, K 320, SMP 9653, pls. 5, 45.
Wall: getting thinner towards rim; undulating irregularities along vertical axis.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated shape; diagonal orientation.
Inclusion: rare in quantity; small and large in dimensions; predominantly rounded shape, some

elongated ones; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.

MM II A

25 Conical cup (PLATE 13) (IB 70)
Complete except for chipped rim; H. 5.1 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: getting thinner towards rim; undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; small to medium in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and rectangular shapes; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

26 Rounded cup (PLATE 13) (IB 68)
Rim-to-base fragment; H. 5.9 cm.
Area encircling the Middle Kouloura.
Momigliano 1991, 236–9, vessel not illustrated.
Wall: similar thickness throughout vessel profile; patchy irregularities along vertical and horizontal axes especially around widest diameter.
Voids/fissures: rare in quantity; small in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to medium in dimensions; rounded to rectangular shapes; preferential horizontal orientation.
Coil seams: none.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

27 Straight-sided cup (PLATE 14) (IB 49)
Rim-to-base fragment with handle; H. 6.0 cm.
Floor beneath Room of the Olive Press.
MacGillivray 1998, K 99, pl. 133.
Wall: getting thinner towards rim; irregularities along horizontal and vertical axes.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

Voids/fissures: moderate in quantity; small in dimensions; elongated shape; preferential horizontal orientation.
Inclusions: abundant in quantity; medium to large in dimensions; mainly rounded and few elongated shapes; elongated ones have horizontal orientation.
Coil seams: 3.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

28 Carinated cup (PLATE 13) (IB 48)
2 joining rim-to-base fragments with handle; H. 7.1 cm.
Floor beneath Room of the Olive Press.
MacGillivray 1998, K 94, pl. 134.
Wall: getting thinner towards rim; undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; small in dimension; elongated shape; diagonal orientation.
Inclusions: moderate in quantity; small to large in dimensions; rounded to elongated shapes, elongated ones have preferential diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

29 Footed mug (PLATE 13) (IB 71)
2 joining rim-to-base fragments with handle; H. 7.6 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: getting thinner towards rim; irregularities along horizontal and vertical axes.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated and irregular shapes; preferential horizontal orientation, but also diagonal and vertical.

Inclusions: abundant in quantity; small to large in dimensions; rounded and rectangular shapes; oriented diagonally along rim, horizontal and diagonal on body.
Coil seams: 2 possible ones.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): handmade.

30 Footed goblet (PLATE 14) (IB 67)
Rim-to-base fragment; H. 7.0 cm.
Area encircling the Middle Kouloura.
Momigliano 1991, 236–9, vessel not illustrated.
Wall: variable thickness; few irregularities along vertical axis.
Voids/fissures: moderate quantity; small to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and rectangular shapes; no orientation.
Coil seams: 1.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

31 Footless goblet (PLATE 14) (IB 69)
Rim-to-base fragment; H. 6.9 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: getting thinner towards rim; irregularities along vertical axis.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: low in quantity; small to medium in dimensions; rounded and elongated shapes; elongated ones have horizontal orientation.
Coil seams: 1.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

32 Flaring bowl (PLATE 14) (IB 50)
Rim-to-base fragment; H. 4.8 cm.
Floor beneath Room of the Olive Press.
MacGillivray 1998, K 127.
Wall: getting thinner towards rim; undulating irregularities along vertical axis.
Voids/fissure: abundant in quantity; medium to large in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; small to very large in dimension; rounded and rectangular shapes, rectangular ones have preferential diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

33 Flaring bowl (PLATE 14) (IB 80)
3 joined rim-to-base fragments, one quarter restored in plaster; H. 4.5 cm.
Vat Room deposit.
Momigliano 1991, n. 14, fig. 4, pl. 34.
Wall: same thickness from base to rim; irregularities along vertical and horizontal axes.
Voids/fissures: moderate in quantity; short in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; small to large in dimensions; square and elongated shapes; no orientation.
Coil seams: 2.
Coil height: 1.3 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

34 Flaring bowl (PLATE 14) (IB 74)
Rim-to-base fragment; H. 4.5 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: similar thickness throughout; light irregularities along vertical axis.
Voids/fissures: abundant in quantity; medium to large in dimensions; elongated shape; preferential horizontal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and rectangular shapes; rectangular ones have horizontal orientation.
Coil seams: 4.

Coil height: 0.8–1.0 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

35 Carinated bowl (PLATE 14) (IB 72)
2 joining rim-to-base fragments with right handle attachment; H. 8.9 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: getting thinner towards carination, rim thicker; irregularities along horizontal axis on lower body.
Voids/fissures: abundant in quantity; small to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; small to medium in dimensions; predominantly rounded shape; no orientation.
Coil seams: none.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

36 Beaked jug (PLATE 14) (IB 81)
4 joining rim-to-base fragments with handle and spout; H. (combined) 17.3 cm.
Vat Room deposit.
Momigliano 1991, 167–75, vessel not illustrated.
Wall: same thickness throughout; irregularities along vertical axis on shoulder and neck.
Voids/fissures: moderate in quantity; short to long in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; medium to large in dimensions; predominantly rounded shape; few elongated ones have horizontal orientation.
Coil seams: 5.
Coil height: 1.0 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

37 Jug (PLATE 15; upper and lower sections in separate images) (IB 54)
Complete except for spout, restored in plaster; H. 33.5 cm.
Area of Polychrome Jug.
MacGillivray 1998, K 891, SMP 9668, pls. 48, 49.
Wall: similar thickness from base to widest diameter, shoulder thicker, neck thinner again; irregularities along vertical and horizontal axes.
Voids/fissures: moderate in quantity; small in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; small to large in dimensions; rounded and elongated shapes; elongated ones have horizontal orientation.
Coil seams: 7.
Coil height: 1.5–2.0 cm.
Forming technique (original publication): handmade.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

38 Juglet (PLATE 16) (IB 79)
Complete except for chipped rim; H. 9.6 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: except for thicker base similar thickness up to rim; undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; medium to large in dimensions; elongated shape; diagonal orientation.
Inclusions: moderate in quantity; small to very large in dimensions; predominantly rounded shapes; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

39 Hole-mouthed jar (PLATE 16) (IB 51)
Rim-to-body fragment with handle; H. 17.2 cm.
Early Floor beneath Room of the Oliver Press.
MacGillivray 1998, 42–4; vessel not illustrated.
Wall: thin lower body, then getting thicker towards rim; rectangular irregularities along horizontal axis.
Voids/fissures: virtually absent in quantity, no dimensions; no shape; no orientation.
Inclusions: abundant in quantity; small to large in dimensions; mainly rounded and some elongated shapes; no orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): not indicated.

Forming technique (visual): drawn (lower part), coiled (upper part).
Forming technique (X-ray): handmade.

40 Necked jar (PLATE 16) (IB 82)
Shoulder-to-base fragment with one handle and one handle attachment; H. 25.3 cm.
Vat Room deposit.
Momigliano 1991, no. 44, pl. 46.
Wall: same thickness from base to rim; irregularities along horizontal and vertical axes.
Voids/fissures: moderate in quantity; small in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; rounded and elongated shapes; elongated ones have horizontal orientation.
Coil seams: 2.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

41 Spouted jar (PLATE 15) (IB 76)
Rim-to-body fragment with tubular spout; H. 24.5 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: similar thickness throughout except for thin section half-way up; rectangular irregularities along horizontal axis.
Voids/fissures: rare in quantity; medium dimensions; irregular shape; horizontal orientation.
Inclusions: moderate in quantity; medium to large in dimensions; mainly rounded shapes; few elongated ones have horizontal orientation.
Coil seams: 1.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

42 Jar (PLATE 16) (IB 53)
7 joined body fragments with vertical handle; H. 14.8 cm.
Early Floor beneath Room of the Olive Press.
MacGillivray 1998, 42–4, vessel not illustrated.
Wall: similar thickness throughout; irregularities along horizontal axis.
Voids/fissures: virtually non-existent in quantity; no dimensions; no shape; no orientation.
Inclusions: abundant in quantity; large in dimensions; rounded and rectangular shapes; rectangular ones have preferential vertical orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): pinched or drawn.
Forming technique (X-ray): drawn?

43 Jar (PLATE 16) (IB 75)
2 joining base and lower body fragments; H. 19.4 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: getting thinner from base upwards; irregularities along horizontal and vertical axes.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; rounded and elongated shape; elongated ones have horizontal orientation.
Coil seams: 4.
Coil height: 1.0–1.5 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): shoulder: coiled; lower body: handmade.
Forming technique (X-ray): coiled.

44 Oval-mouthed amphora (PLATE 17; upper and lower sections in separate images) (IB 55)
Rim, neck, shoulder and handles fragment; 4 joined shoulder to lower body fragments: H. (combined) 39.9 cm.
Royal Pottery Stores, Area of the Lime Kiln.
MacGillivray 1998, K 820, SMP 9709, pl. 116.
Wall: similar thickness of body fragment; marked irregularities along vertical axis.
Voids/fissures: moderate in quantity; small to large in dimensions; predominantly irregular air spaces, some elongated ones; horizontal orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; rounded and rectangular shapes; rectangular ones have horizontal orientation.
Coil seams: 13.

Coil height: 1.5–2.5 cm.
Forming technique (original publication): handmade.
Forming technique (visual): lower body: handmade; shoulder: coiled.
Forming technique (X-ray): coiled.

45 Amphora (PLATE 17) (IB 78)
Rim-to-shoulder fragment with handle, base to lower body fragment; H. (combined) 18.6 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: neck has same thickness throughout, no data for shoulder, base fragment getting thinner upwards; patchy irregularities along horizontal axis (base fragment).
Voids/fissures: moderate in quantity; short to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to large in dimensions; predominantly rounded shape; no orientation.
Coil seams: 2.
Coil height: 1.5–2 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): coiled [with subsequent drawing or scraping on base fragment].
Forming technique (X-ray): coiled [with subsequent drawing or scraping on base fragment].

46 Amphora (PLATE 17) (IB 56)
Complete; H. 11.4 cm.
Royal Pottery Stores, Area of the Lime Kiln.
MacGillivray 1998, K 816, SMP 9701, pl. 111.
Wall: getting thinner towards upper body, thick around shoulder, thin neck region; irregularities along vertical and horizontal axes.
Voids/fissures: moderate in quantity; short in dimensions; elongated shape; horizontal orientation.
Inclusions: rare in quantity; small to very large in dimensions; rounded and elongated shapes; elongated ones have horizontal orientation.
Coil seams: 3.
Coil height: 1.0 cm.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

47 Tripod cooking pot (PLATE 17) (IB 52)
5 partly joined fragments of rim to base, leg and two handles; H. (combined) 37.3 cm.
Floor beneath Room of the Olive Press.
MacGillivray 1998, K.128, pl. 29.
Wall: same thickness throughout; irregularities along horizontal axis.
Voids/fissures: rare in quantity; small in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to very large in dimensions; predominantly rounded shapes, some rectangular ones; rectangular ones have horizontal orientation.
Coil seams: 3.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): handmade [with subsequent drawing].
Forming technique (X-ray): coiled [with subsequent drawing].

48 Closed vessel (PLATE 17) (IB 77)
Base to lower body fragment; H. 10.5 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7, vessel not illustrated.
Wall: getting thinner towards rim; irregularities along vertical axis.
Voids/fissures: rare in quantity; short in dimensions; irregular shape; no orientation.
Inclusions: abundant in quantity; small to medium in dimensions; rounded and elongated shapes; elongated ones have horizontal and vertical orientation.
Coil seams: 4?
Coil height: 1.5 cm?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): handmade.

49 Tub (PLATE 15) (IB 73)
Rim to upper body fragment with handle and base to lower body fragment; H. (combined) 20.1 cm.
Monolithic Pillar Basement.
Momigliano 1991, 163–7.
Wall: getting thinner towards rim, rim itself thick; some irregularities along horizontal axis.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated shape; no orientation.

Inclusions: abundant in quantity; medium to large in dimensions; elongated and rounded shapes; no orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): handmade.

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50 Saucer (PLATE 18) (IB 27)
Rim-to-base fragment; H. 2.4 cm.
KV Trial.
Popham 1975, 186, vessel not illustrated.
Wall: except for thick base, roughly even thickness up to rim; no irregularities.
Voids/fissures: rare in quantity; short to medium in dimensions; elongated shape; horizontal/diagonal orientation (lack of normal view makes it difficult to establish orientation)
Inclusions: abundant in quantity; small to very large in dimensions; rounded and elongated shapes; elongated ones have horizontal/diagonal orientation (lack of normal view makes it difficult to establish orientation)
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated, but wheel-thrown by implication.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): uncertain.

51 Conical cup (PLATE 20) (IB 23)
Rim-to-base fragment; H. 4.4 cm.
KV Trial.
Popham 1975, 186, vessel not illustrated.
Wall: getting thinner towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; long in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and elongated shapes; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

52 Bell-shaped cup (PLATE 18) (IB 24)
Complete except for chipped rim; H. 5.3 cm.
KV Trial.
Popham 1975, 186, vessel not illustrated.
Wall: getting thinner towards carination, even thickness above it; light undulating irregularities along vertical axis.
Voids/fissures: rare in quantity; small in dimensions; irregular shape; no orientation.
Inclusions: abundant in quantity; small to medium in dimensions; mainly rounded shapes; no orientation.
Coil seams: 2?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): uncertain.

53 Straight-sided cup (PLATE 18) (IB 26)
Complete; H. 8.2 cm.
KV Trial.
Popham 1975, 186, pl. 28 *g*.
Wall: getting thinner towards upper body, rim section slightly thicker again; undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; medium in dimensions; elongated shape; diagonal orientation.
Inclusions: moderate in quantity; small to medium in dimensions; mainly rounded shapes; no clear orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

54 Carinated cup (PLATE 18) (IB 25)
Rim-to-base fragment with handle; H. 4.7 cm.
KV Trial.
Popham 1975, 196, vessel not illustrated.
Wall: getting thinner towards rim; undulating irregularities along vertical axis up to carination.
Voids/fissures: abundant in quantity; medium to long in dimensions; elongated shape; diagonal orientation.

Inclusions: moderate in quantity; small to medium in dimensions; mainly rounded and some elongated shapes; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

55 Small bowl (PLATE 19) (IB 28)
Complete except for chipped rim; H. 3.7 cm.
KV Trial.
Popham 1975, vessel not illustrated.
Wall: getting thinner towards rim, rim itself thick; undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; long in dimensions; elongated shape; diagonal orientation.
Inclusions: moderate in quantity; small to large in dimensions; rounded and elongated shapes; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

56 Flaring bowl (PLATE 18) (IB 29)
Rim-to-base fragment; H. 7.7 cm.
KV Trial.
Popham 1975, vessel not illustrated.
Wall: thick at base, thin middle section, thick rim; light undulating irregularities along vertical axis in body section.
Voids/fissures: virtually absent in quantity; no dimensions; no shape; no orientation.
Inclusions: abundant in quantity; small to medium in dimensions; mainly rounded and some elongated shapes; no orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-coiled.
Forming technique (X-ray): handmade [with subsequent shaping on wheel].

57 Large bowl (PLATE 18) (IB 42)
Joined rim-to-base fragments, restored in plaster; H. 13.9 cm.
Loomweight Basement.
MacGillivray 1998, K 193, SMP 2024, pls. 26, 131.
Wall: similar thickness throughout, rim itself thicker; irregularities along vertical and horizontal axes.
Voids/fissures: abundant in quantity; medium to large in dimensions; elongated shape; horizontal orientation.
Inclusions: rare in quantity; small to medium in dimensions; elongated shape; preferential horizontal orientation.
Coil seams: 3.
Coil height: 1.5–2.0 cm.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): coiled?
Forming technique (X-ray): coiled.

58 Deep basin (PLATE 18) (IB 43)
3 non-joining rim-to-body fragments with one handle; H. 17.9 cm.
Loomweight Basement.
MacGillivray 1998, K 195, pl. 131.
Wall: same thickness throughout; light undulating irregularities along the horizontal and vertical axis.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; medium to large in dimensions; rounded and elongated shape; elongated ones have horizontal orientation.
Coil seams: 3.
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

59 Tub (PLATE 18) (IB 30)
Complete vessel profile with handle, one-third of vessel preserved; H. 15.4 cm.
KV Trial.
Popham 1975, vessel not illustrated.
Wall: except for thick base, similar thickness throughout; some irregularities along vertical axis.
Voids/fissures: rare in quantity; small in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to medium and very large in dimensions; rounded and some elongated shapes; elongated ones have horizontal orientation.
Coil seams: 2?

Coil height: 1.5 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled; rim area wheel-coiled?

60 Bucket (PLATE 20) (IB 31)
5 partly joined rim and upper body fragments; H. 19.2 cm.
KV Trial.
Popham 1975, 188, pl. 32 *b*.
Wall: thick lower body, thin upper body; patchy irregularities along horizontal and vertical axes.
Voids/fissures: virtually absent in quantity; no dimensions; no shape; no orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; mainly rounded and some elongated shapes; elongated ones have preferred horizontal orientation.
Coil seams: 4.
Coil height: 1.0 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

61 Bucket (PLATE 19) (IB 32)
4 joined rim-to-body fragments with handle; H. 21.1 cm.
KV Trial.
Popham 1975, vessel not illustrated.
Wall: same thickness from base to just below rim, rim itself thicker; irregularities along horizontal and vertical axes.
Voids/fissures: rare in quantity; short in dimensions; irregular air spaces; no orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; rounded and elongated shapes; no preferred orientation.
Coil seams: 2?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled?

62 Bucket (PLATE 19) (IB 33)
7 joined rim-to-base fragments with vertical handle; H. 22.0 cm.
KV Trial.
Popham 1975, 188, pl. 32 *d*.
Wall: same thickness from base to just below rim, rim itself thicker; irregularities along horizontal and vertical axes.
Voids/fissures: rare in quantity; short in dimensions; irregular air spaces; no orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; rounded and elongated shapes; no preferred orientation.
Coil seams: 1?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled?

63 Tray (PLATE 19) (IB 45)
Rim-to-base fragment; H. 1.7 cm.
Loomweight Basement.
MacGillivray 1998, K 192, pl. 132.
Wall: thicker in centre, thinner towards edge, rim itself thick; localized irregularities.
Voids/fissures: rare in quantity; small in dimensions; elongated shape; no orientation.
Inclusion: rare in quantity; small in dimensions; mainly rounded and some elongated shapes; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): moulded [with subsequent shaping on wheel].
Forming technique (X-ray): moulded or pinched [with subsequent shaping on wheel].

64 Tray (PLATE 20) (IB 36)
2 joined rim-to-base fragments; H. 2.7 cm.
KV Trial.
Popham 1975, vessel not illustrated.
Wall: similar thickness throughout; undulating irregularities.
Voids/fissures: virtually absent in quantity; no dimensions; no shape; no orientation.
Inclusions: abundant in quantity; small to very large in dimensions; mainly rounded and some elongated shapes; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.

Forming technique (visual): mould-made [with subsequent shaping on wheel].
Forming technique (X-ray): mould-made [with subsequent shaping on wheel].

65 Lamp (PLATE 21) (IB 35)
3 joined rim-to-base fragments with handle; H. 3.9 cm.
KV Trial.
Popham 1975, vessel not illustrated.
Wall: thick at base, thinner middle section, thick rim; undulating irregularities along vertical axis.
Voids/fissures: virtually absent in quantity; no dimensions; no shape; no orientation.
Inclusions: moderate in quantity; small to large in dimensions; mainly rounded and some elongated shapes; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): uncertain.

66 Large jar (PLATE 19) (IB 40)
Multiple joined base-to-body fragments;
H. 32. 5 cm.
West Polychrome Deposits.
MacGillivray 1998, K 688, SMP 9693, pl. 92.
Wall: getting thinner upwards; irregularities along vertical and horizontal axes.
Voids/fissures: moderate in quantity; small to medium in dimensions; elongated shape; no orientation.
Inclusions: abundant in quantity; medium to large in dimensions; mainly rounded shape; no orientation.
Coil seams: 3?
Coil height: ?
Forming technique (original publication): handmade.
Forming technique (visual): handmade.
Forming technique (X-ray): handmade.

67 Jar (PLATE 20) (IB 46)
5 non-joining fragments of base, body and shoulder; H. (combined) 22.5 cm.
Loomweight Basement.
MacGillivray 1998, K 202, pl. 130.
Wall: similar thickness throughout; many irregularities along horizontal and vertical axes.
Voids/fissures: moderate in quantity; small in dimensions; elongated shape; some oriented horizontally, others clearly vertically.
Inclusions: abundant in quantity; medium to large in dimensions; mainly rounded shapes; no orientation.
Coil seams: 1 (shoulder/neck)
Coil height: n/a.
Forming technique (original publication): handmade.
Forming technique (visual): coiled.
Forming technique (X-ray): handmade—probably combination of techniques.

68 Oval-mouthed amphora (PLATE 20) (IB 34)
Joined rim and shoulder fragments with one complete handle and one handle attachment;
H. 14.4 cm.
KV Trial.
Popham 1975, 188, pl. 31 *c* (bottom right).
Wall: getting thicker towards shoulder, relatively consistent thickness from shoulder to neck; irregularities on upper body and shoulder along horizontal and vertical axes, irregularities on neck along vertical axis.
Voids/fissures: upper body: abundant in quantity; short to medium in dimensions; elongated shape; preferential vertical orientation.
Shoulder and neck: abundant in quantity; medium to long in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and elongated shapes; elongated ones have horizontal orientation (shoulder and neck) and preferential vertical orientation (upper body).
Coil seams: neck: 2; shoulder: 3.
Coil height: neck: 1.0 cm; shoulder: ?
Forming technique (original publication): not indicated.
Forming technique (visual): shoulder: coiled, neck: uncertain, upper body: handmade.
Forming technique (X-ray): shoulder and neck: coiled, upper body: drawn/pinched.

69 Closed vessel (PLATE 21) (IB 41)
Base-to-body fragment; H. 17.9 cm.
Loomweight Basement.
MacGillivray 1998, 39–42; vessel not illustrated.
Wall: except for thick base, similar thickness throughout; irregularities along vertical and horizontal axes.

Voids/fissures: abundant in quantity; small in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; large to very large in dimensions; mainly rounded and some elongated shapes; elongated ones have horizontal orientation.
Coil seams: 6.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): coiled.

70 Pedestalled lamp (PLATE 20) (IB 44)
Foot fragment; H. 18.9 cm.
Loomweight Basement.
MacGillivray 1998, K 204; pl. 26.
Wall: getting thinner towards rim; undulating irregularities along vertical axis.
Voids/fissures: moderate in quantity; small in dimensions; elongated shape; horizontal orientation.
Inclusions: few in quantity; small to very large in dimensions, rounded (large) and elongated (small) shape, elongated ones have horizontal orientation.
Coil seams: 3?
Coil height: ?
Forming technique (original publication): wheel-thrown.
Forming technique (visual): wheel-coiled.
Forming technique (X-ray): wheel-coiled.

MM III A

71 Conical cup (PLATE 21) (IB 20)
Rim-to-base fragment; H. 3.0 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; medium to large in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; medium to large in dimensions; rounded and elongated shapes; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

72 Straight-sided cup (PLATE 22) (IB 19)
4 joined rim-to-base fragments with lower handle attachment; H. 7.4 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards middle and then thicker towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; small in dimensions; elongated shape; diagonal orientation.
Inclusions: rare in quantity; small in dimensions, rounded shape; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray) wheel-thrown.

73 Carinated cup (PLATE 22) (IB 16)
Rim-to-base fragment, handle missing; H. 6.4 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards middle, then getting thicker again; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; medium in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; small to medium in dimensions, rounded shape and few elongated ones; elongated ones have diagonal or horizontal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

74 Jug (PLATE 21) (IB 39)
Joined rim-to-base fragment, partially restored in plaster; H. 25.5 cm.
Deposit: none given.
MacGillivray 1998, K 962, SMP 9738; Vessel not catalogued or illustrated.
Wall: getting thinner from base to widest diameter, shoulder thicker, neck thinner again; irregularities along vertical and horizontal axes.
Voids/fissures: abundant in quantity; large in dimensions; elongated shape; horizontal orientation.
Inclusions: rare in quantity; medium to large in dimensions; rounded and elongated shapes; elongated ones have horizontal orientation.
Coil seams: 4 (body), 3 (shoulder).
Coil height: 1.2 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

75 Bridge-spouted jar (PLATE 22) (IB 37)
Joined rim-to-base fragment with handle, restored in plaster; H. 15.3 cm.
South Polychrome Deposits.
MacGillivray 1998, K 977, SMP 9736, pls. 30, 149.
Wall: getting thinner towards widest diameter, then getting thicker towards rim; undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; medium to large in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and elongated shapes; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheel-thrown.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

76 Jar (PLATE 21) (IB 38)
Complete except for one handle; H. 23.8 cm.
Corridor S. N + E. between House of Sacrifice and House of Fallen Blocks.
MacGillivray 1998, SMP 9739; vessel not illustrated.
Wall: getting thinner towards widest diameter, shoulder area thicker, neck thin again; irregularities along horizontal and vertical axes.
Voids/fissures: rare in quantity; small in dimensions; irregular shape; no orientation.
Inclusions: abundant in quantity; medium to very large in dimensions; mainly rounded shape; no orientation.
Coil seams: 7.
Coil height: 1.0–2.0 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled (body and upper body); handmade (lower body).

77 Cooking pot (PLATE 22) (IB 17)
Base to lower body fragment; H. 10.0 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards top; undulating irregularities along vertical axis.
Voids/fissures: moderate in quantity; medium to large in dimensions; elongated shape; preferential orientation differs (horizontal/diagonal near upper break; horizontal near lower break).
Inclusions: abundant in quantity; medium to large in dimensions; mainly rounded and some elongated shapes; elongated ones have horizontal/diagonal orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): uncertain.
Forming technique (X-ray): uncertain.

78 Tripod cooking pot (PLATE 22) (IB 18)
3 joined base to lower body fragments, legs missing; H. 11.4 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: similar thickness throughout; irregularities along horizontal and vertical axes.
Voids/fissures: abundant in quantity; small to medium in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; medium to large in dimensions, rounded shape, no orientation.
Coil seams: ?
Coil height: ?

Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

MM III B

79 Conical Cup (PLATE 22) (IB 11)
Rim-to-base fragment; H. 4.3 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; large in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; small to large in dimensions, mainly rounded shape; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

80 Conical cup (PLATE 22) (IB 12)
4 joining rim to lower body fragments; H. 4.3 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards rim, rim itself thicker; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; large in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; small to medium in dimensions; mainly rounded shape; diagonal orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): uncertain.
Forming technique (X-ray): wheel-thrown.

81 Straight-sided cup (PLATE 22) (IB 15)
2 joining rim-to-base fragments; H. 6.8 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards rim; undulating irregularities along vertical axis.
Voids/fissures: moderate in quantity; medium in dimensions; elongated shape; diagonal orientation (lower 2/3), no orientation (upper 1/3).
Inclusions: abundant in quantity; medium to large in dimensions; mostly rounded shape and few elongated ones; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

82 Bowl (PLATE 22) (IB 14)
Rim to upper body fragment; H. 8.2 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: even thickness throughout; light irregularities along vertical axis.
Voids/fissures: rare in quantity; medium in dimensions; elongated shape; horizontal orientation—some diagonal ones at very bottom of fragment.
Inclusions: abundant in quantity; small to large in dimensions; mainly rounded and some elongated shapes; elongated ones have horizontal orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-coiled.
Forming technique (X-ray): upper section: handmade, lower section: uncertain.

83 Closed vessel (PLATE 22) (IB 13)
Base to lower body fragment; H. 7.3 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: similar thickness throughout; few irregularities.
Voids/fissures: rare in quantity; medium in dimensions; irregular shape; no orientation.
Inclusions: abundant in quantity; large in

dimensions; predominantly rounded shape; no orientation.
Coil seams: n/a.
Coil height: n/a.

LM I A

84 Conical cup (PLATE 23) (IB 5)
Complete; H. 4.0 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards rim; undulating irregularity along vertical axis.
Voids/fissures: abundant in quantity; large in dimensions; elongated shape; diagonal orientation.
Inclusions: moderate in quantity; small to medium in dimensions, elongated shape; diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

85 Rounded cup (PLATE 23) (IB 22)
Almost complete vessel assembled from 8 fragments; H. 6.7 cm.
KV Trial.
Popham 1975, 185, pl. 32 *g* (far left).
Wall: getting thinner towards rim, rim itself thicker; light undulating irregularities along vertical axis.
Voids/fissures: moderate in quantity; short in dimensions; elongated shape; diagonal orientation (view from top), undetermined (frontal view).
Inclusions: moderate in quantity; small to large in dimensions; rounded and elongated shapes; elongated ones have horizontal/diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

86 Bell-shaped cup (PLATE 23) (IB 6)
Rim-to-base fragment; H. 5.5 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Forming technique (original publication): not indicated.
Forming technique (visual): handmade.
Forming technique (X-ray): uncertain.

Wall: getting thinner towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; large in dimensions; elongated shape; no orientation
Inclusions: moderate in quantity; small to large in dimensions; mostly rounded, few elongated shapes; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

87 Straight-sided cup (PLATE 23) (IB 10)
2 joined rim-to-base fragments, handle missing; H. 6.5 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thinner towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; large in dimensions; elongated shape; diagonal orientation.
Inclusions: abundant in quantity; small to medium in dimensions; rounded and elongated shapes; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

88 Bucket (PLATE 23) (IB 9)
2 joined rim to upper body fragments with right handle attachment; H. 14.1 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: except for thick rim, similar thickness throughout; patchy irregularities along vertical axis.
Voids/fissures: virtually non-existent in quantity; no dimensions; no shape; no orientation.

Inclusions: abundant in quantity; large in dimensions; rounded and rectangular shapes; rectangular ones have preferential horizontal orientation.
Coil seams: 1.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

89 Tray (PLATE 23) (IB 7)
Rim-to-base fragment; H. 2.1 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting slightly thinner towards rim, rim itself thick.
Voids/fissures: rare in quantity; small in dimensions; elongated shape; no orientation.
Inclusions: abundant in quantity; medium to large in dimensions; mainly rounded shape, few elongated ones; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): mould-made and subsequently shaped on wheel.
Forming technique (X-ray): uncertain.

90 Small tripod cooking pot (PLATE 23) (IB 21)
Virtually complete vessel assembled from 13 rim to foot fragments with one lug handle; H. 13.5 cm.
KV Trial.
Popham 1975, 184, vessel not illustrated.
Wall: getting thinner towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; medium to long in dimensions; elongated shape; diagonal orientation.
Inclusions: moderate in quantity; small to large in dimensions; rounded and elongated shapes; elongated one have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

91 Closed vessel (PLATE 23) (IB 8)
3 joined base to lower body fragments; H. 21.8 cm.
Acropolis Houses.
Catling, Catling, and Smyth 1979, vessel not illustrated.
Wall: getting thicker towards top; irregularities along horizontal axis.
Voids/fissures: moderate in quantity; short to large in dimensions; elongated shape; horizontal orientation.
Inclusions: abundant in quantity; small to large in dimensions; predominantly rounded shape; no orientation.
Coil seams: 1.
Coil height: ?
Forming technique (original publication): not indicated.
Forming technique (visual): coiled.
Forming technique (X-ray): coiled.

LM II

92 Saucer (PLATE 24) (IB 1)
Rim-to-base fragment, rim chipped; H. 4.9 cm.
South Front of the Palace.
Momigliano and Hood 1994, vessel not illustrated.
Wall: getting thinner towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; large in dimensions; elongated shape; horizontal orientation.
Inclusions: moderate in quantity; small to medium in dimensions; rounded and elongated shapes, elongated ones have horizontal orientation.
Coil seams: 1?
Coil height: 2.0–2.5 cm.
Forming technique (original publication): not indicated.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-coiled.

93 Conical cup (PLATE 24) (IB 2)
Rim-to-base fragment; H. 4.6 cm.
South Front of the Palace.
Momigliano and Hood 1994, no. 59, fig. 16.
Wall: getting thinner towards rim; light undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; large in dimensions; elongated shape; diagonal orientation.

Inclusions: moderate in quantity; small to medium in dimensions; rounded and elongated shape; no orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheelmade.
Forming technique (visual): wheel-thrown.
Forming technique (X-ray): wheel-thrown.

94 Jug (PLATE 24) (IB 4)
5 joined lower-body-to-base fragments; H. 6.3 cm.
South Front of Palace.
Momigliano and Hood 1994, no. 17, fig. 11.
Wall: getting thinner upwards, top 2 cm thicker again; undulating irregularities along vertical axis.
Voids/fissures: abundant in quantity; medium to large in dimensions; elongated shape; diagonal orientation.
Inclusions: low in quantity; small to medium in dimensions; rounded and elongated shapes; elongated ones have diagonal orientation.
Coil seams: n/a.
Coil height: n/a.
Forming technique (original publication): wheelmade.
Forming technique (visual): wheel-coiled.
Forming technique (X-ray): wheel-thrown.

95 Cooking pot (PLATE 24) (IB 3)
Rim to upper body fragment; H. 6.8 cm.
South Front of the Palace.
Momigliano and Hood 1994, no. 51, fig. 15.
Wall: same thickness throughout; light irregularities along vertical axis.
Voids/fissures: rare in quantity; medium in dimensions; elongated shape; horizontal/diagonal orientation.
Inclusions: abundant in quantity; small to large in dimensions; rounded and elongated shapes; elongated ones have horizontal orientation.
Coil seams: ?
Coil height: ?
Forming technique (original publication): wheelmade.
Forming technique (visual): uncertain.
Forming technique (X-ray): coiled.

Suitability of X-Radiography for Prehistoric Cretan Clays

The research has demonstrated the suitability of X-radiography for prehistoric Cretan clays in general. Fine, semicoarse and coarse fabrics were investigated and were clearly visible on the X-ray. As discussed elsewhere, there are some general limitations that impact on the visibility of any X-ray, such as the proportion of inclusions/temper within the clay matrix, the thickness of the sherd and the contrast in density between different particles (Berg 2008). These also apply to our Knossian sample and, for example, often hindered identification of specific manufacturing techniques of heavily tempered clays due to overlaying particles (e.g. **52**, **77**, **83**, **89**, **95**). Overall, 80 vessels (a success rate of over 80%) could be assigned to a specific primary forming technique, while 9 could merely be identified as 'handmade' and 6 had to be classed as 'uncertain'. There is no doubt that X-radiography, alongside visual inspection, thin-sections and chemical analysis, has a contribution to make to our understanding of ancient pottery.

X-Radiography vs. Visual Inspection

Pottery specialists often pride themselves on being able to identify forming techniques accurately. However, there is rarely an opportunity to check the reliability of our observations against scientific data. As X-ray analysis required the scanning and digitization of the original X-ray images while a visual inspection could be done on the spot, visual assessment and X-ray analysis were separated in time and space, affording the opportunity to compare the results,

which were, for all intents and purposes, arrived at independently. In addition, published assemblages sometimes contained information on the forming technique that could be drawn on as additional independent data sets. The results show that (*a*) in 23% of the cases pottery specialists do not agree with one another's categorization of forming techniques, and (*b*) in up to 25% of the cases they have been misled by the expertise of ancient potters who often obliterated traces of the primary forming by applying secondary techniques—this is particularly apparent in the case of coiled vessels that were subsequently wheel-coiled and might be identified as wheel-thrown (TABLE 1). In other instances, X-ray data were able to provide greater detail. For example, 'handmade' vessels could clearly be identified as 'coiled' (e.g. **2**, **5**, **6**, **9**, **10**). However, X-radiography does not allow the identification in all cases, and, in some (rarer) instances, visual traces provided clearer indicators of manufacture than radiographs. Examples can be found in **7**, **8**, **39**, and **56**. Thus it is clear that a combination of techniques will give us the greatest possible chance of an accurate identification of past primary forming techniques. As regards secondary forming techniques, they cannot normally be recognized radiographically and will always require visual assessment.

Discussion and Conclusion

With the potential of X-radiography for Cretan clays established, we can now turn to an interpretation of the findings. While every effort was made to sample a large number of vessels and ensure a representative spread of open and closed, fine and coarse vessels, small and large, etc., for each period, excavation and publication biases could not be overcome: in total 95 vessels were X-rayed, EM III/MM I A being represented by 11 vessels, MM I B by 13, MM II A by 25, MM IIB by 21, MM III A by 8, MM IIIB by 5, LM I A by 8, and LM II by 4. In order to achieve larger sample sizes, periods had to be combined for analysis.

Forming techniques show a long-term trend: handmade vessels gradually decline over time while techniques utilizing the potter's wheel (fully or partially) become more popular after its introduction in MM I B. In line with other work (e.g. Knappett 1999, 204; MacGillivray 1998; 2007), this study confirms that the introduction of the potter's wheel did not result in an immediate replacement of handmade modes, but it was adopted gradually (FIG. 2). Most importantly, handmade techniques never vanish complete, but remain the most common construction method for larger vessels even in the Late Bronze Age. The existence of slow wheel use is confirmed for Knossos. Present already in EM III/MM I A as part of a combination technique (**1**), it is clear that potters toyed with the concept of a wheel prior to the actual introduction of the fast wheel. Surprisingly perhaps, wheel-coiling continues through time and can still be found as a (occasional) manufacturing method in LM II. This development naturally raises questions about the potter's wheel itself, its capabilities and the potters' expertise. Overall, a wide range of forming techniques was used, mostly individually but also in combinations. In addition to the combination jar identified in the British Museum X-ray study (Berg and Ambers, forthcoming), this analysis has revealed a further two clear examples (**1** and **68**—a cup and an amphora) where the wheel was combined with coiling or coiling with drawing. While these combination techniques are infrequently represented in this sample, it is likely that they were regularly used by potters in all periods.

The association of vessel types and shapes with forming techniques is an interesting one: while both hand and wheel techniques are used to produce virtually all vessel types, there is a

TABLE 1. Comparison of the accuracy of primary forming technique identification by X-radiography and visual inspection.

Catalogue No.	Technique based on X-radiography	Technique based on visual inspection by author	Technique given in original publication
1	Base: wheel-thrown; body: wheel-coiled & drawn; rim: wheel-coiled	Handmade and shaped on wheel	Handmade
2	Coiled	Handmade	Handmade
3	Coiled (and knife-trimmed)	Knife-trimming has obliterated all traces	Handmade
4	Handmade?	Coiled?	Handmade
5	Coiled	Handmade	Handmade
7	Handmade	Coiled	Handmade
8	Handmade	Coiled	Handmade
9	Coiled	Handmade	Handmade
10	Coiled	Handmade	Handmade
11	Coiled	Handmade	Handmade
12	Wheel-thrown	Wheel-thrown	Wheel-thrown
14	Wheel-coiled (and knife-trimmed)	Handmade and knife-trimmed	Handmade
15	Wheel-coiled	Wheel-thrown or wheel-coiled	Wheel-thrown
16	Wheel-thrown	Wheel-thrown	Wheel-thrown
17	Lower 2/3: drawn; upper 1/3: wheel-coiled	Handmade and shaped on wheel	Wheel-thrown
18	Coiled	Handmade	Handmade
19	Wheel-coiled (and knife-trimmed)	Wheel-coiled and knife trimmed	Handmade
20	Coiled	Coiled	Handmade
21	Coiled	Coiled	Handmade
22	Coiled	Handmade	Handmade
23	Wheel-thrown	Wheel-thrown	Wheel-thrown
24	Wheel-thrown	Wheel-thrown	Wheel-thrown
27	Coiled	Handmade	Handmade
28	Wheel-thrown	Wheel-thrown	Wheel-thrown
32	Wheel-thrown	Wheel-thrown	Wheel-thrown
37	Coiled	Coiled	Handmade
44	Coiled	Lower body: handmade; shoulder: coiled	Handmade
46	Coiled	Coiled	Wheel-thrown
47	Coiled (and drawn)	Handmade and drawn	Handmade
57	Coiled	Coiled?	Wheel-thrown
58	Coiled	Coiled	Handmade
63	Moulded or pinched (and shaped on wheel)	Moulded and shaped on wheel	Wheel-thrown
66	Handmade	Handmade	Handmade
67	Handmade – probably combination of techniques	Coiled	Handmade
70	Wheel-coiled	Wheel-coiled	Wheel-thrown
75	Wheel-thrown	Wheel-thrown	Wheel-thrown
93	Wheel-thrown	Wheel-thrown	Wheel-thrown
94	Wheel-thrown	Wheel-coiled	Wheel-thrown
95	Coiled	Uncertain	Wheelmade

predominance of using the wheel for cups (FIG. 3). As a direct consequence of this preference, wheel-thrown vessels are much more likely to be small (<10 cm). Handmade ones, on the other hand, are represented evenly across the entire height spectrum (FIG. 4). Broadly speaking, wheel-thrown vessels are made of finer clays as can be seen by the inclusion

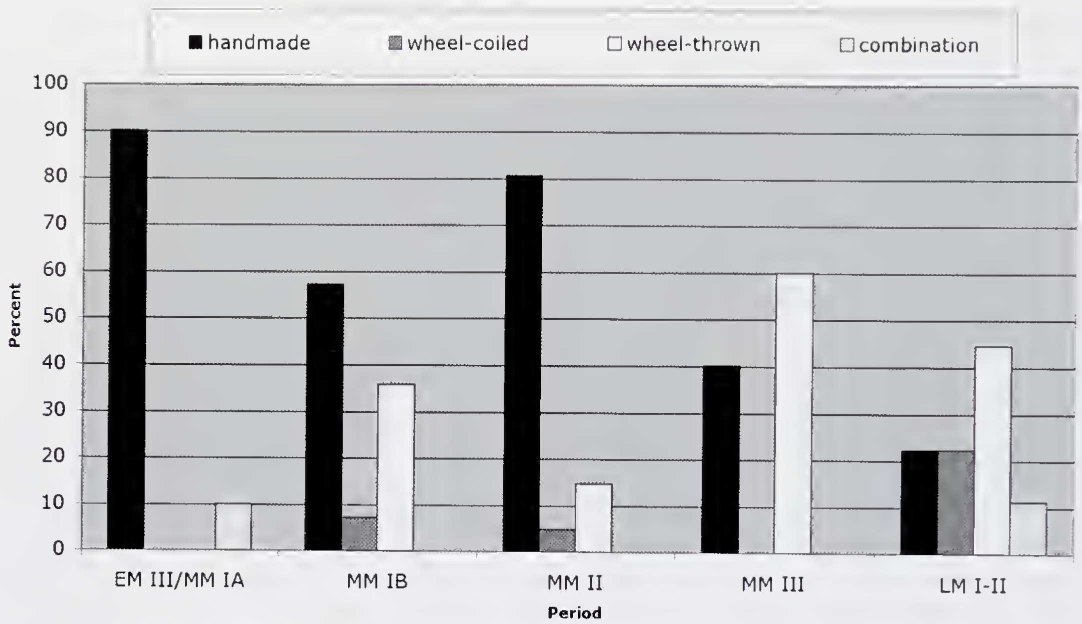

FIG. 2. Comparison of forming techniques by period.

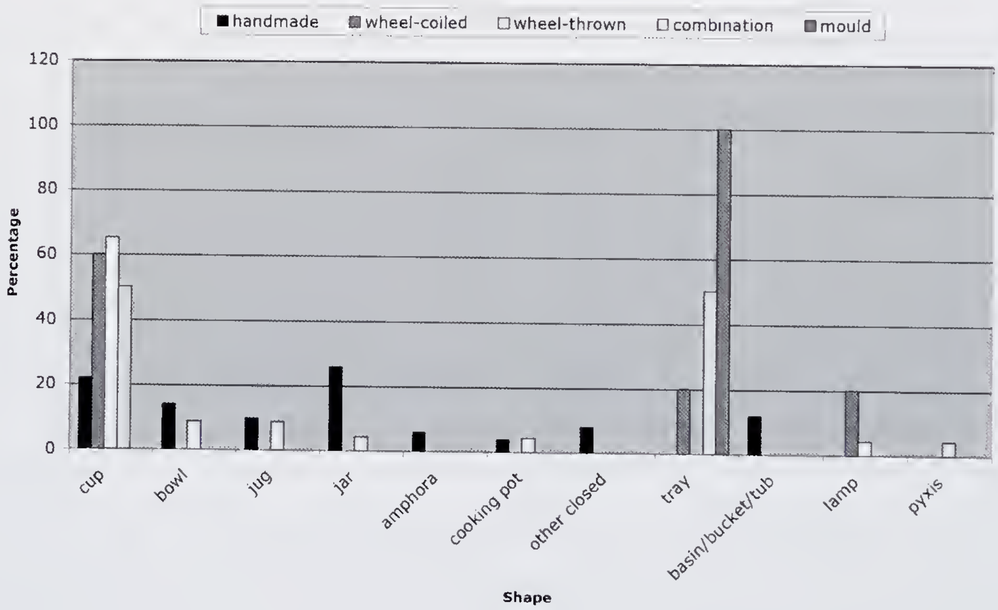

FIG. 3. Comparison of vessel types by forming techniques.

frequencies which show a much higher proportion of few or moderate quantities of inclusions. Handmade pots have the highest proportion of abundant inclusions (FIG. 5).[4] Looking at functional categories, it is interesting to note that serving, cooking and storage vessels can be found in most forming techniques, but processing vessels seem to be the

[4] No such division is discernable between inclusion sorting and size, or indeed forming technique, where all categories are comparatively evenly matched with each showing a spread of good to very poor sorting. Whether this is an accurate reflection of the assemblage or reflects a subconscious bias in the same requires a larger-scale study.

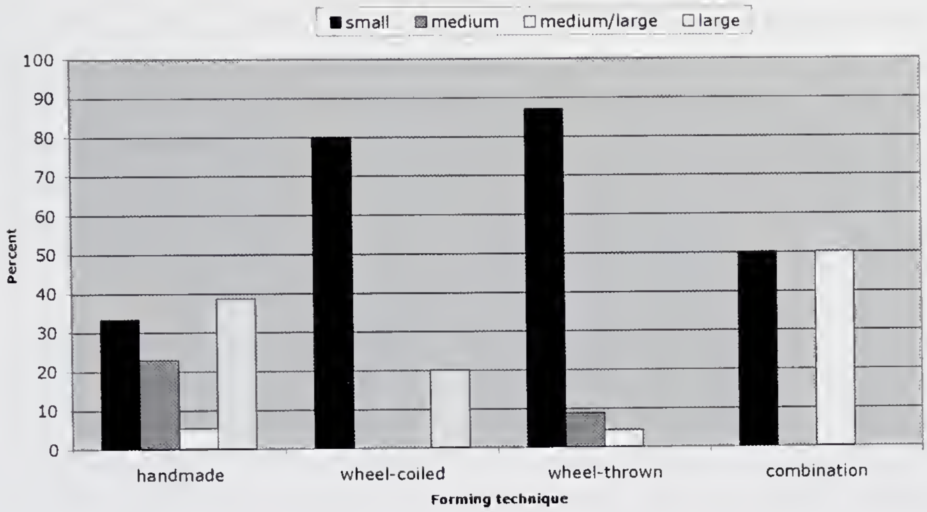

FIG. 4. Comparison of vessel size by forming techniques.

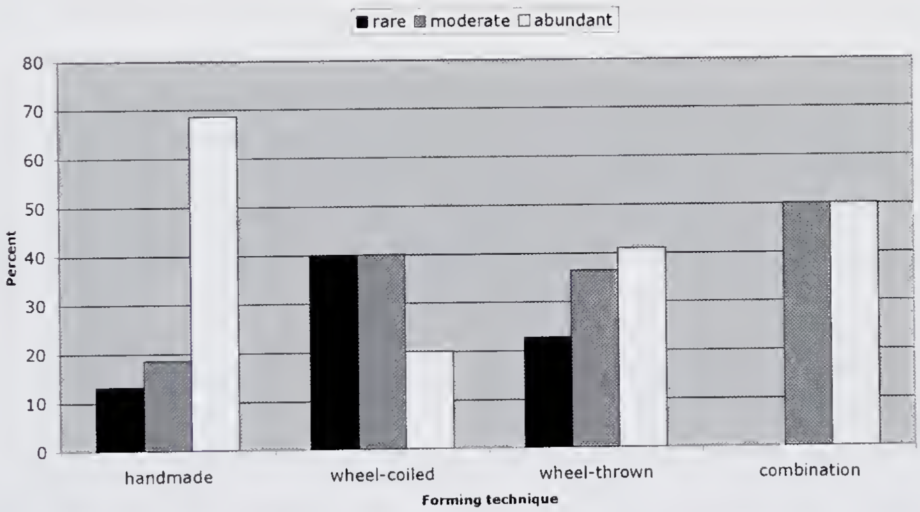

FIG. 5. Comparison of inclusion frequency by forming techniques.

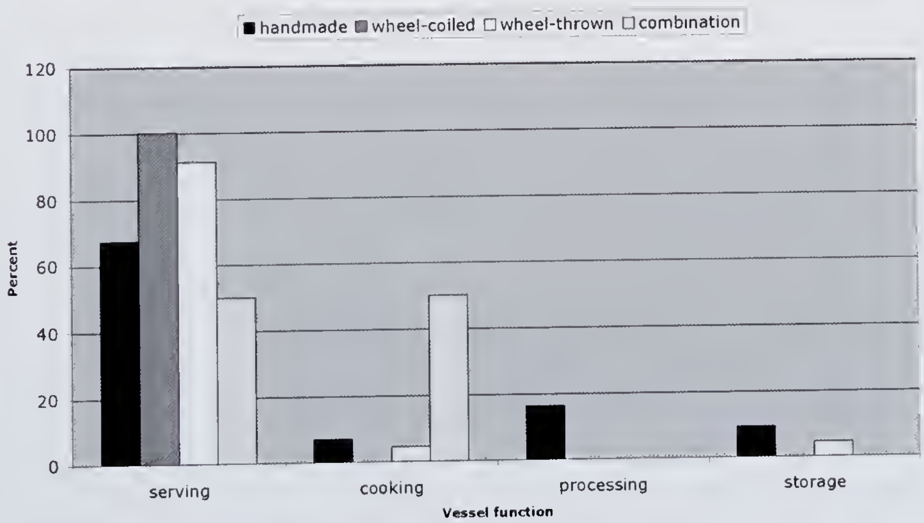

FIG. 6. Comparison of vessel function by forming techniques.

exclusive domain of handmade techniques (FIG. 6). In all, the results presented here confirm that our macroscopically-derived knowledge of the Knossian ceramic development is in line with scientific data. However, the X-ray study also highlights our lack of knowledge and our frequent inability to illuminate the specifics of an individual vessel's manufacturing process. The reconstruction of two different forming techniques for the making of stirrup jars (Leonard *et al.* 1993), the recognition of wheel-coiled vessels, and the existence of vessels that combined multiple forming techniques are only three examples of how the interpretative potential of X-radiography studies can benefit pottery specialists.

As a technique, X-radiography has much to offer to pottery specialists working on prehistoric Cretan ceramics. Fine and semicoarse fabrics are highly suitable for analysis, though X-radiography is less successful when applied to coarse fabrics with abundant inclusions as these have a tendency to overlap and thus obscure potential features. The technique is equally suitable for small and large vessels, and, while fragments should be as large as possible, it makes no difference whether vessels are complete or fragmentary.

Given the comparative ease and speed with which X-rays can be taken, the non-destructiveness of the technology and the relatively low costs involved make radiography an ideal companion both for visual assessments and established scientific techniques, such as thin section analysis. Until now, application to Greek material has been sparse and selective. However, it is hoped that the presence of an industrial X-ray machine, ideally suited to X-ray analysis of all small finds, at the INSTAP Study Centre for East Crete, as well as mobile units and technicians for loan from the Technological Educational Institution of Athens (Giannoulaki *et al.* 2006) will make X-radiography much more affordable and appealing to pottery specialists.

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MYCENAE AND TIRYNS: THE POTTERY OF THE SECOND HALF OF THE THIRTEENTH CENTURY BC – CONTEXTS AND DEFINITIONS[1]

Introduction (By E.B. French and Ph. Stockhammer)

In modern times, from the excavations by Schliemann to the present day, when Mycenae and Tiryns have been granted jointly the status of a World Heritage Site, the two sites have been linked. The relationship between them in the Bronze Age is, however, much less clear and has become more complex with subsequent research. Recent coordinated studies of the pottery at each site by those actually working on the material can offer a firm foundation for future work.

Schliemann was extremely interested in the pottery he found, compiling albums of the finds for each site (Hood 1960). After him, Furtwängler and Loeschcke (1879; 1886) published important stylistic accounts of the ceramic material known at that point. At the request of V. Stais, then Director of the National Museum in Athens, this was continued by Wace during the First World War (*BSA* 21, 1914–16, 187, Annual Report). Our work today, however, is based on the monumental study by A. Furumark (1941*a*; 1941*b*), undertaken to analyse the sherd material from Asine, which was transported in quantity back to Sweden for study. After 1955, French (E.B. French 1963) studied a series of deposits from Mycenae in order to date the figurines found in them. This work appeared to be supported by the copious and high quality material from the West Wall Deposit at Tiryns (known as the Ephichosis: Verdelis, French, and French 1965). Unfortunately the final, more detailed publication (Voigtländer 2003) throws doubt on the depositional history of the deposit. Thus this material must be used with great caution until we know the results of a total reassessment of the deposit now in progress by E.B. French and W. Gauss.

To the groups used originally by French, three groups of material have been added from the Citadel House Area excavations (Mountjoy 1976; Wardle 1969; 1973). Since then, study of the site as a whole has continued but the complex stratigraphy and the many important finds have required many years of work. During this period provisional results have been

[1] Our thanks are due to Ken Wardle for making us write this justification of our terminology; to Joseph Maran for his support throughout; to Kim Shelton, Jacke Phillips, Sofia Spyropoulou, and Nikos Katsoulieris for last minute checking and drawing in the Mycenae Museum; and Martina Riedl for her most useful assistance in Tiryns and Athens. Stockhammer's research at the University of Heidelberg is funded under the initiative 'Cluster of Excellence – Asia and Europe in a global context'.

The publication series of the Helleno-British Excavations at Mycenae 1959–1969 '*Well Built Mycenae*', edited by W.D.Taylour, E.B. French, and K.A.Wardle, is listed under the abbreviation WBM. The fascicules relevant to this article are as follows:

WBM 1 = Taylour, W.D. 1981. *The Excavations* (Warminster); WBM 9 = Taylour, W.D., French, E.B. and Wardle, K.A. in preparation. *The South House and Annex* (Oxford); WBM 10 = Moore, A.D. and Taylour, W.D. 1999. *The Temple Complex* (Oxford); WBM 11 = Moore, A.D. and Taylour, W.D. forthcoming. *The Room with the Fresco Complex* (Oxford); WBM 12 = Andrew, R.A. under study. *The Megaron Complex* (Oxford); WBM 13 = French, E.B. and Taylour, W.D. 2007. *The Service Areas of the Cult Centre* (Oxford); WBM 16/17 = French, E.B. forthcoming. *The Post-Palatial Levels* (Oxford); WBM 21 = Crouwel, J.H. 1991. *The Mycenaean Pictorial Pottery* (Oxford); WBM 34.1 = French, E.B., Hoffmann, S.M.A., Jones, R.E., Robinson, V.J. and Tomlinson, J.E. forthcoming. '*Technical reports: the Results of Neutron Activation Analysis of Mycenaean Pottery* (Oxford).

made available to colleagues but these have on occasion been misunderstood (Iakovides 1986, 2003; E.B. French unpublished, 1987).

At Tiryns studies of the Mycenaean pottery, although of considerable interest to Müller and well summarized by E. Slenczka in Jantzen 1975, took second place to the architecture and to studies of other periods. The first systematic work on the Mycenaean painted wares was undertaken by Podzuweit in the context of Kilian's excavations on the site from 1976 to 1985. In several preliminary reports and his *Habilitationsschrift* (upon which Podzuweit 2007 is based) he based his argument on the sherd material from the stratified settlement layers in the Unterburg and the North-Western Lower Town.[2] The sudden deaths of both Kilian and Podzuweit, within a short period of time, brought to an end the intense period of research initiated by the former. Since 1994, however, work at Tiryns by the German Archaeological Institute has been resumed under the direction of Joseph Maran of Heidelberg University. He has supported the publication of work already started and new work on the Mycenaean pottery from the North-Eastern and North-Western Lower Town (Stockhammer 2008). In addition, he has encouraged work on an important pottery assemblage from a recent excavation of the Fourth Ephorate of the Greek Archaeological Service in the area of the Western Staircase (Kardamaki in progress), in cooperation with Alkistis Papadimitriou.

Archaeologists at Mycenae and Tiryns have been in close contact throughout recent excavation and study, although the two sites are by no means identical in their pottery fashions. With completion of the final study of all but one area of the Citadel House Area (WBM 1, 9, 10, 11, 13, 16/17; only WBM 12, the Megaron Complex, remains unfinished) and the pottery of the North-Eastern Lower Town in Tiryns (Stockhammer 2008) and the ongoing re-evaluation of the pottery from the North-Western Lower Town and the Unterburg, it became possible to attempt a stratigraphically based historical reconstruction for both sites: unfortunately this was pre-empted by a well thought-out but publication-based study (Vitale 2006), which has the potential to cause considerable confusion.

In this paper, after an outline of the methodological approach used, we describe the actual methods of excavation and recording used at each site and how these have affected post-excavation study and analysis. We then put forward in detail the evidence afforded by the pottery from Mycenae and Tiryns with a suggested definitive terminology for the second half of the thirteenth century BC, the later stages of the LH III B period in the Argolid. No suggestion is made that these specific characteristics have chronological relevance beyond the Argolid, although it may be interesting to note their presence/absence in other regions. The features are presented in tabular form in TABLE 1.

Methodological Background (By E.B. French and Ph. Stockhammer)

The principles of the seriation of prehistoric pottery styles on the basis of the stratigraphic sequences at one or more sites have been understood in the Aegean, at least, since the work of Mackenzie at Phylakopi in the late nineteenth century (Momigliano 1999, 23–5) and the suggestion that the Aegean could be linked chronologically to other regions on the basis of

[2] The long catalogue contained in Podzuweit's *Habilitationsschrift* has not been included in Podzuweit 2007.

TABLE 1. Features of LH III B2 pottery from Mycenae and Tiryns.

LH III B2 Early (FIGS. 21–2)			
Diagnostic features		*Mycenae*	*Tiryns*
FS 64	Collar necked jar: small	FIG. 21. 1	FIG. 21. 2
FS 284	Deep bowl: Rosette DB (i.e. with dotted rim)	FIG. 21. 3	FIG. 21. 4
	Deep bowl: type B	FIG. 21. 5	FIG. 21. 6
FS 296	Shallow bowl/Plate: white on the interior bands		FIG. 21. 7
Problematic features		*Mycenae*	*Tiryns*
FS 215	Deep cup: linear in & out	FIG. 22. 1	
	Deep cup: dotted rim	FIG. 22. 3	
	Deep cup: mono in & unpainted out		FIG. 22. 2
FS 284	Deep bowl: type A/B		FIG. 22. 4
	Deep bowl: linear in & out		FIG. 22. 5
LH III B2 Late (FIGS. 23–4)			
Diagnostic features		*Mycenae*	*Tiryns*
FS 69/ 106/128	Large closed vessels: slightly hollowed lip, linear	FIG. 23. 1	FIG. 23. 2
FS 215	Deep cup: dotted rim	FIG. 23. 3	Voigtländer 2003, 80 pl. 55, 117 TA 6
	Deep cup: Mono in, medium rim band = medium band cup		FIG. 23. 5
	Deep cup: linear in & out	FIG. 23. 4	
FS 267	Carinated kylix: linear or partially monochrome	FIG. 23. 6	FIG. 23. 7
FS 274	Conical kylix: dotted rim	FIG. 24. 6	
FS 284	Deep bowl: mono in, medium rim band (0.5>2.4) & no pattern outside		FIG. 24. 2
	Deep bowl: type A/B		FIG. 24. 3
	Deep bowl: stemmed bowl banding out, mono or linear in	FIG. 2. 2	FIG. 24. 5
	Deep bowl: mono in with reserved circle at base		FIG. 24. 4
	Deep bowl: sinuous profile	FIG. 24. 1	FIG. 13. 2
	Deep bowl: linear Rosette DB (i.e. with linear banding)		FIG. 24. 7
FS 295B	Shallow bowl: rounded		FIG. 24. 8
Problematic features		*Mycenae*	*Tiryns*
FS 215	Deep cup: stemmed bowl banding outside		FIG. 19. 9

the pottery was put forward by Petrie in 1890 (Phillips 2006). However, the underlying difficulties of definition and interpretation have often been less well understood.

The main difficulty lies in ascertaining the deposition history of what are usually called 'deposits'. A deposit can result from an event or from a process. An event such as an earthquake may leave pots and other artefacts more or less *in situ*, perhaps on a floor. These would have been 'in use' (of one kind or another) at a particular moment in time although that does not mean that they were all manufactured at the same time. Many items, for

example in palaces or shrines or even in general storage, may be 'antiques' and there may be nothing that is actually contemporary with the event causing the withdrawal from use. The problem with these groups is that the range of pottery of each is restricted by the functional context and is thus unlikely to be widely representative. Mountjoy (1993, 119–28) devotes a most useful chapter to this background of interpretation, although her site summaries are now largely out of date.

Deposits deriving from a process, what we might term cumulative deposits, will consist mainly of sherds; such pieces as may have been partially mended or restored on paper are not truly 'whole pots'. The material is likely to have originated in rubbish (discarded material) and will comprise a high proportion of such pots as break easily or are in constant use. The date range of such material may be wide with a high proportion from earlier periods of heavy occupation. Some fills may derive mainly from a single source, but others may well have been moved in a variety of processes: through human agency to make mudbrick or a roof, to serve as fill or ballast in a foundation terrace, or by chance, washed down a slope by rain, or falling with the collapse of a wall or other retaining feature (Renfrew 1985; Tzounou-Herbst 2002).

The problems of identifying the accumulation process of a cumulative deposit and thus assessing its potential as a resource have led some scholars (D.H. French forthcoming) to give up the use of such evidence wherever possible. Ethnoarchaeology, however, can offer considerable assistance. Particularly useful is the work of Blum (2003) and Dittemore (1983). The former analyses the reuse of sherd material in construction, sherd paving, drainage channels etc. by observing recent activity of using and abandoning houses in the Turkish village Işıklar. The latter excavated a ruined village house in the village of Zemzemiye in Turkey before investigating its known history. Such studies may also help in understanding the construction processes variously in use, particularly the use of terracing on steep slopes, involving both the removal of some levels and the construction of others.

Scientific Background (By E.B. French and Ph. Stockhammer)

The fact that two sites are geographically close does not mean, *per se*, that their pottery was produced from the same clay sources or produced in the same workshops. Visually the material found at Mycenae and at Tiryns is very similar, as has been apparent to all from Schliemann onwards. French, however, was both surprised and dismayed to note that the material from the copious Epichosis deposit at Tiryns was tactilely superior to material with which she was familiar from Mycenae. The pottery from the area of the Ivory Houses at Mycenae (excavated and studied between 1950 and 1958) was of very good quality itself but did not have quite the excellent surface of much of the Tiryns group. As the Epichosis probably originates from the actual Palace area of the site, the difference may be the result of this factor but it may be a characteristic of a distinct workshop.

The application of physico-chemical analyses to the provenancing of pottery was started for the Aegean by Hector Catling and the Oxford Laboratory using Optical Emission Spectroscopy and was followed by Neutron Activation Analysis (NAA) of these sherds by G. Harbottle (summarized Jones 1984; 1986). More extensive testing of Mycenaean pottery by NAA was undertaken in 1970 by Asaro and Perlman under the aegis of the Swedish Institute in Athens (Asaro and Perlmann 1973). Samples from both Mycenae (84) and Tiryns (43), as well as other sites, were collected. The former were chosen by a student of the British School

(without supervision from anyone excavating on the site), the latter by Voigtländer from the Epichosis material on which he was working. The results were later entered on computer and statistically analysed at Manchester. More recently Hans Mommsen (Bonn University) has run these computerized data with those from his own programme of testing (see WBM 34 pl. 1 forthcoming for full references and discussion). Further work in Manchester brought the total sample from Mycenae to just over 300 in several projects, including a detailed comparative study of the fabrics found (E.B. French *et al.* 1984). As part of this fabric study, a series of samples for petrological examination were taken by John Riley in consultation with the Mycenae excavators for a project under David Peacock at Southampton University. Unfortunately funding for this project was withdrawn before its completion and publication.

In Tiryns, many more sherds were sampled for NAA in the context of the project 'Untersuchungen zur Keramikproduktion und -distribution bronzezeitlicher Siedlungen Griechenlands und der Ägäis mit Hilfe der Neutronenaktivierungsanalyse' under the direction of Joseph Maran and Hans Mommsen. The project was financed from 1993 to 1997 under the 'Neue Technologien in den Geisteswissenschaften' programme of the German Federal Ministry of Education and Research. Between 1995 and 1997, samples of 2500 vessels from different parts of Greece were taken, of which 1500 have been analysed so far (Maran, Hein, Ittameier and Mommsen 1997*a*; 1997*b*; Mommsen and Maran 2000/1; Maran and Mommsen 2008).

The important result of these projects, for the purposes of this paper, is that despite differences in statistical method between the Manchester and Bonn groups working in NAA, those samples for Mycenae and Tiryns, which are dated stylistically between LH III A2 and LH III C, are distinctly separate. The Tiryns group can be assigned geographically to that region thanks to kiln wasters found on the Unterburg, and may to a certain extent derive from the kiln found in horizon 19a (Kilian 1981, 165–6; Mommsen *et al.* 1989). Although this kiln was very short-lived, it probably indicates at least one clay source for the site. Unfortunately no Bronze Age kiln is known from Mycenae and attempts to link samples from the clay sources (at Longaki and Plesia) to samples that have been fired have, as yet, not been successful. Samples of earlier Mycenaean pottery (LH II–LH III A1) present a quite different picture but it is not relevant to this study.

A division of power in the Argolid, dividing Mycenae and the area towards Corinth from Argos and Tiryns to the south, is, of course, reflected in Homer (*Il.* ii. 559–77). This is reflected also in the Bronze Age road system as far as it has been preserved (E.B. French 2002, fig. 3). Whether this division is purely economic or reflects two separate administrative units within the Mycenaean kingdom of the Argolid must be considered in any historical hypothesis for the end of the Palatial period.

The Citadel House Area at Mycenae 1953–69 (By E.B. French)

The Citadel House Area was the last completely unexcavated area within the Citadel at Mycenae. Wace had long wished to work here, fascinated by the two doorways, leading to the south section of the South House, that were clearly visible in the southern baulk of the area (Wace 1949, pl. 85 *a*). The site measured some 23 m N–S and 31 m E–W with a depth of deposit from 3 m to over 7 m. It lay on a steep slope, the base of the Citadel wall to the west being some 13.5 m below the top of the Hellenistic Terrace Wall to the east. It is this steep

slope and the terracing used in building on it that have caused much of the difficulty with final planning and interpretation.

The history of the excavation with relevant plans has been given by Taylour (WBM 1). From the start each basket of pottery was given a unique number. This number has been retained in all excavation records and publications referring to what is termed a 'unit' of excavation. From 1962 the site was divided on a grid system but given the depth of deposit and the height of surviving walls, much work was done by rooms. The excavation team had a wide variety of archaeological training and the systems that were adopted, often in response to practical issues, were likewise varied. We knew from the start that we were seeking to clarify the history of the site as known from the work of the 1920s, and to find answers to questions arising from previous excavations.

TABLE 2 shows the available Mycenae Archive (all of which is numbered and recorded in a card index) and its interrelations. The contexts or phasing were determined by a process of correlating the various sources of evidence available. Some were self-evident; others required deduction, possibly subjective. If some were uncertain before restudy, this was noted and many have since been reassigned once detailed restudy has taken place (e.g. the revised list of the registered pictorial pottery of WBM 21 now issued on the CD).

The availability of computers about half way into the study seasons brought two new possibilities: the Small Finds indexes were entered onto computer through a Manpower Services Project at the University of Birmingham, and the contexts were assigned numerical designations so that lists of units could be set out as spreadsheets. These designations have been based, as far as possible, on the identification of the original source and subsequent depositional history of the material in each unit. In this way the chronological parameters of each unit can be assessed and the information accurately used in reconstructing the history of the site (TABLE 3). The details of this system and the designations are given in each fascicule of WBM.

The Lower Citadel and Lower City of Tiryns 1876–2003 (By Ph. Stockhammer)

THE EXCAVATION

While starting his excavation on the Oberburg (Upper Citadel), Heinrich Schliemann also excavated preliminary trenches on the Unterburg (Lower Citadel) in 1876. This was followed by further activities in the early twentieth century in the Unterburg and the Lower City (Unterstadt) under the direction of the German Archaeological Institute. However, it was the discovery of the 'syringes' (underground passages to a water supply) in 1962 by the Anastylosis Service and their subsequent excavation by Nicolas Verdelis (Ephor of the Argolid) that resulted in the first large-scale excavation in the Lower Citadel. After the death of Verdelis, the excavation in the Lower Citadel was taken over in 1967 by the German Archaeological Institute under the direction of Ulf Jantzen.

It was the series of large-scale excavations in the North-Western Lower Town and in the Lower and Upper Citadel from 1976 to 1985 under the direction of Klaus Kilian that produced the richest evidence and finds of the Palatial and the Post-Palatial period in Tiryns. But after Kilian's sudden death in 1992, the investigation of Tiryns came to an abrupt end.

TABLE 2. Mycenae: The Excavation Archive

Archive level	SITE						MATERIALS			
PRIMARY	Director's Notebook	Photographs	Trench Notebook	Pot Sections	Plans	Sections	SF cards	or	Control Book	Pottery Notes
RESERVE	Albums	List/index	Microfilm and TSS	List/index	List/index	List/index	Index	or	SF card	Microfilm
SECONDARY		1. Trench Summaries and Diagrams	2. Unit Sheets			or Constructs	Computer		Entries	Rework
						CONTEXTS = PHASING				
TERTIARY		Running Text		Room Sheets			1. Materials List by Room/Phase 2. Specialist Reports			

TABLE 3. Phases in Citadel House Area at Mycenae.

Pottery phase	Architectural phase	Phase designation	Event	Description
LH III B1	VI B	0660	Construction	South House followed by South House Annex Temple Complex, Room with the Fresco Complex, Service Areas
LH III B Mid = LH III B2 Early	VII	0720 0731	Alterations **Earthquake**	Rooms xxiv, 32, and 38 added **Destruction level with pottery on floors**
LHIII B2 Early LH III B2 Late	VIII	0805 0828 0831	Infill and repairs Refuse **Earthquake**	Deliberate infill over pottery etc Pisé repairs, new floors Causeway deposit **Burnt destruction all over site, some pottery on floors**
LH III C Early 1	IX	0918 0910 0931	Terracing Construction **Earthquake**	New terraces built over destroyed buildings using the destruction level pottery as sherdage in the fill West and South complexes built **Destruction level with pottery on floors**

Since 1997 fieldwork has resumed under the direction of Joseph Maran in several areas of the acropolis and Lower Town (1997–8 Upper Citadel, 2000–3 Lower Citadel, 2006–8 Western Lower Town) and in cooperation with Alkistis Papadimitriou in 1999–2000 in the North-Eastern Lower Town. A detailed history of the excavation of the Lower Citadel is given by Tobias Mühlenbruch (2005).

An excavation grid of 10 by 10 m squares was introduced in Tiryns in 1971, laid out over the whole settlement. These large squares ('Großquadrat') were numbered with arabic numerals from north to south and roman numerals from west to east, so that every large square is easily identified by the combination of a roman and an arabic numeral. Each large square was further divided into 100 small squares of 1 × 1 m, starting with no. 1 in the north-west corner of the large square and ending with square 100 in the south-east corner. The excavation took place by Abhübe or spits of approximately 10 cm unrelated to the stratigraphy, unless floors or other surfaces were met. These spits were numbered with roman numerals, from 'I' at the top downwards. Special features were excavated separately and all small finds measured three dimensionally in their exact position. Kilian also added the designation 'R' to all find contexts inside a room, not just the floor level. Using his interpretation of both the stratigraphic and architectural evidence Kilian was able to amalgamate the different Abhübe and Oberflächen (surfaces) into horizons (TABLE 4; cf. Kilian 1988*a*, 132 fig. 27 = Kilian 1988*b*, 120 fig. 2; Mühlenbruch 2005), i.e. Nutzungsphasen (phases of settlement activity) based mainly on Laufflächen (trodden surfaces). Where it was not possible to trace such surfaces, e.g. in courtyards, Kilian sometimes refrained from attributing Abhübe to certain horizons. The dating of the different horizons was done by Kilian on the basis of the pottery found *in situ*, i.e.

TABLE 4. Architectural horizons at Tiryns.

Pottery phase	Architectural phase	Architectural horizon	Major activity	Description
LH III B2 Early	SH III B Mitte	16a0	Construction	Large building complex with corridor extending over two terraces: Rooms 190, 214, 215, 216, 211 (Corridor), 209, 210, 207, 208
		16a1–a6	Repair	Repair of the floors at least once, in places twice; Restoration on two occasions of the older Citadel Wall (built in SH III B Früh) constructed of rubble with a mudbrick superstructure.
		Event	**Earthquake Destruction**	**Destruction of the older Citadel Wall and the building complex probably by an earthquake**
		16a7	Destruction Layer	Destruction layer
LH III B2 Late	SH III B Entwickelt	17a0	Levelling and Construction	Levelling of the remains of the older buildings; a short stretch of the lower structure of the Citadel Wall remains standing in LXI 42–4; Extensive building activity in the Lower Citadel: Erection of the Cyclopean wall with the casemates and the two Syringes; Terracing of the Lower Citadel by building retaining walls; Layout of a path network oriented north-south; Erection of the best known buildings of LH III B2, e.g. building complexes I-VIII-VII, building VI together with the 'Zwinger' (a court or more technically a 'bailey'), building X, building XIV in front of Kw (casemate) 14 with the well
		17a1–3	Repair	Partial renewal of floors (Hor. 17a3).
		Event	**Earthquake Destruction**	**The buildings suffer slight damage, probably caused by a small earthquake**
	SH III B Ende	17a4–5	Repair and Construction	Repair of the damaged buildings; most rooms are given a new floor. The well inside Kw 14 is filled. Major building activities on the Citadel Wall: blocking of most of the casemates (exceptions: Ko 4, Kw 9–11, Kw 14). First major building activity in the northern most part of the Lower Citadel: construction of the Northern gate and of buildings XI and XV
		Event	**Earthquake Destruction**	**Destruction of the buildings of the Palatial period by a heavy earthquake; all buildings are affected**
		18	Destruction Layer	Destruction layer
LH III C Early 1	SH III C Früh	19a0-a1	Repair and Construction	Provisional inhabitation of the ruins before systematic rebuilding; only small remains preserved: R 10a, R 119, potter's kiln, Kw 14

largely restorable pots, following the chronological systems worked out by Christian Podzuweit and by Guntram Schönfeld. In order to differentiate clearly between Kilian's architectural horizons and our terminology based on the development of the pottery, we use Kilian's German terminology for the designation of the architectural horizons (SH III B Früh, Mitte, Entwickelt, Ende) and the English for the designation of the pottery phases (LH III B1, B2 Early, B2 Late, C Early 1, etc.).

Because of the terrace layout of the Unterburg, the correlation of the Laufflächen from different areas was difficult. Where possible, this difficulty was overcome by connecting adjacent areas with the help of the long stratigraphic sections across the whole Unterburg. In some cases Kilian achieved the correlation solely on the basis of the pottery evidence, but making this explicit in his documentation. The fact that during the Palatial period the Unterburg was hit by three major destruction events and another event that caused minor damage has provided a sufficiently secure framework for understanding the history of the site and the correlation of the stratigraphic layers (cf. Kilian 1988*b*, 121 fig. 3, and confirmed by Damm-Meinhardt's work). The first destruction marks the end of SH III B Früh (horizon 15a3). The second at the end of SH III B Mitte (horizon 16a7) led to the construction of the Cyclopean wall around the Unterburg and a completely new organization of the settlement. A third but minor event caused some damage in most of the houses belonging to SH III B Entwickelt, resulting in repairs (horizon 17a4) and new floors (horizon 17a5) at the end of SH III B. Shortly after this, the entire settlement and the Palace were completely destroyed. In the Unterburg the debris of this fatal catastrophe (horizon 18) marks the end of the Palatial period.

The availability of computers has allowed the excavators and those who work on the finds to establish databases in which the type and quantity of finds are recorded for each excavated square. However, such databases exist, at present, only for the pottery from the North-Eastern Lower Town (Stockhammer) and from Kilian's excavation in the Palace area (H. Stülpnagel 2000), the figurines (M. Vetters), and the small finds (L. Rahmstorf) from Tiryns as a whole. In addition, all the finds from the latest excavations on the Unterburg and the Western Lower Town are recorded in this way.

RECORDING AND ARCHIVING

The documentation of Kilian's excavation of the Lower Citadel does not enable us to evaluate complete floor deposits, as the pottery was not stored by find context in the storerooms at Tiryns, but by the type of ware and parts of vessels. During the excavations pencil drawings of several tens of thousands of vessels and vessel fragments were made and afterwards stored in the Tiryns archive of the German Archaeological Institute at Athens. Only a systematic revision of this corpus—each drawing is stored by the date of its production and not by its context or stratification—would allow the reassembly of the floor contexts with restorable vessels from the Unterburg. Therefore, we are not at present able to reconstruct the total number and type of vessels found in a certain room in a certain phase of the settlement. In her re-evaluation of the Unterburg stratigraphy, Ursula Damm-Meinhardt lists only the vessels for every room published so far by Kilian and Podzuweit. However, the published material is just a small and subjective selection of the huge number of vessels found in each context. Especially for LH III B2 Late, only a very few vessels have been illustrated in the preliminary reports and in Podzuweit 2007.

The Contexts of LH III B2 Late at Mycenae (fig. 1) (By E.B. French)

In contrast to the contexts of Phase VII (usually known as LH III B Mid), those of the great destruction at the end of Phase VIII produced far fewer restorable pots. All pottery from contexts not published in full is illustrated here; from those already published we illustrate some diagnostic pieces. All were found on or close to identifiable floors. The sherd evidence in the 'fill' material enclosing them was (almost without exception) of the typical Citadel House Area type comprising material ranging from at least MH to LH III B1.

A. South House Annex and the South House

Room 1

Excavated in 1954; published Wace 1955, 177–81 (Plan fig. 2); Chadwick 1962, 37; WBM 1, 16–17, and described in detail in WBM 9.

Although originally described as 'cut out of the rock slope', the clearing of the outside of the entrance at the north end of this room in 1960 showed that it was in fact an independent storeroom of plastered mudbrick construction like the rest of this building. The first interpretation was that a stamped floor was the original one and the plaster floor some 20 cm above was a later alteration. Below the stamped floor was a fairly deep layer of small stones ('potatoes'), laid as elsewhere to facilitate drainage. The plaster floor is preserved only in the central part along the north–south axis of the room and at the north-west corner by the door. The west and east sides of it had been cut away to make room for emplacements sunk in the lower earthen floor to receive large storage vessels. Eight such emplacements could be recognized but there may have been two more along the east side.

After study however, it would seem that both floors were contemporary, the stamped earth floor being a working surface on which the vessels were positioned and then held in place by the plaster floor laid round them. In either case these vessels were broken and scattered before the room was burnt. This is clear both from the fragmentary nature of the examples like the large stirrup jar (54–578, fig. 3. 3) and from markings on the vat (54–526, fig. 3. 1). Such destruction would also account for the broken edges of the settings in the plaster floor. As well as the many fragments of large vessels, there were also found in this room a large amount of amorphous lead, a 'Canaanite' jar (fig. 3. 2) and several pots with pierced bases (fig. 2. 3, 5). These were probably purely functional (cf. Kommos: Koehl 1981, 181; 2006, 9–10), serving to fill the larger vessels. The wide diversity of types among the large vessels as well as among the fillers is of particular interest.

Pot 54–289 (fig. 2. 2) was originally published as LH III C (corrected Chadwick 1962, 46). The outer rim decoration is of Stemmed Bowl type, a type that has been identified as a feature of LH III B2 Late, but the fact that the pot also has the Stemmed Bowl band low on the inner body has caused confusion. The pot has been re-examined in the Mycenae Museum storeroom and the base exists, that of a Deep Bowl although it seems to have been deliberately cut off. An additional atypical feature of this pot is the poor quality of the decoration in the handle zone. However, given that four of the eight pots are possibly reused in a secondary context, their production date may be meaningless in terms of the final destruction of the room.

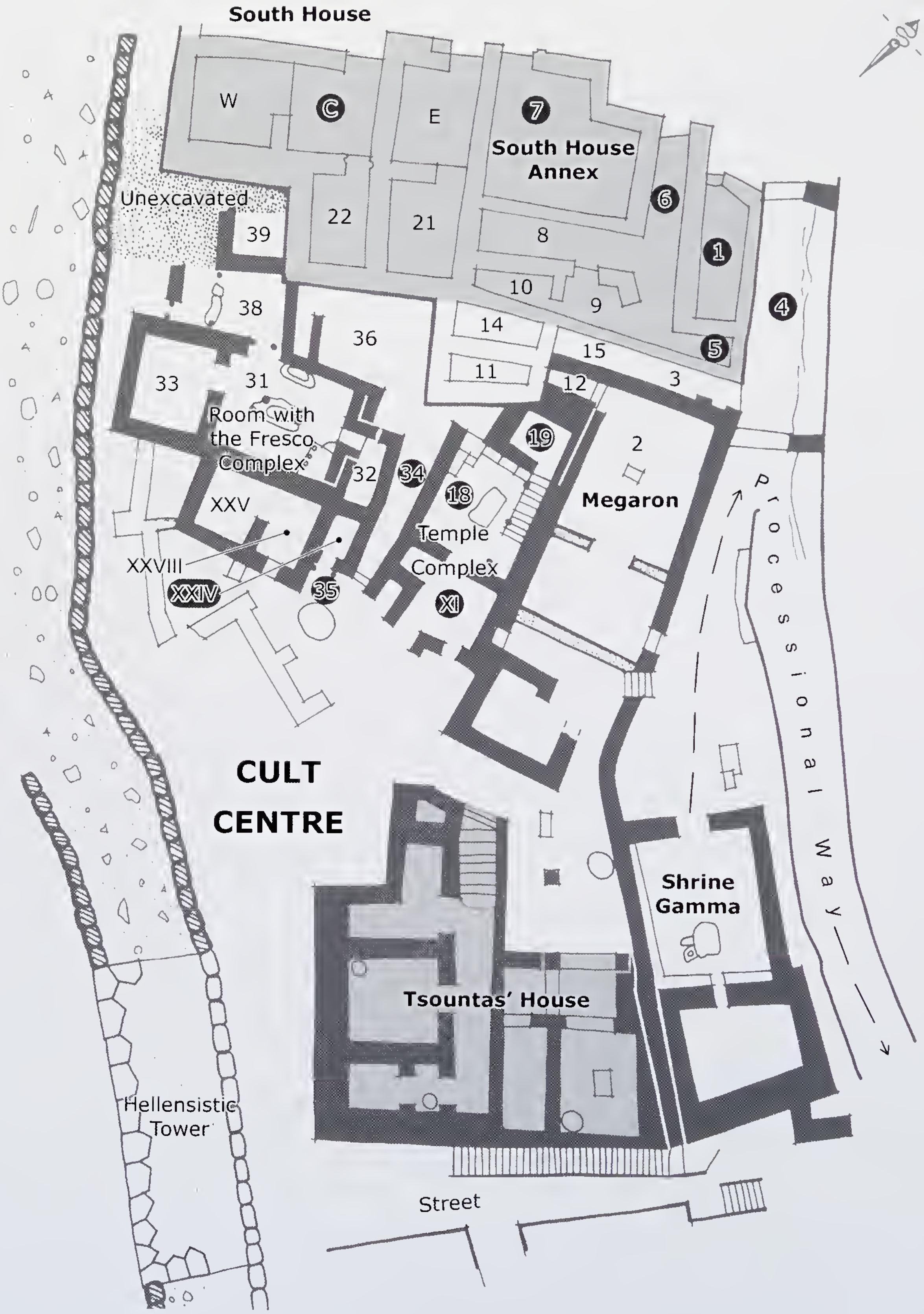

FIG. 1. Mycenae: Plan of the Citadel House Area at the end of LH III B2 Late.

FIG. 2. Mycenae: South House Annex Room 1.

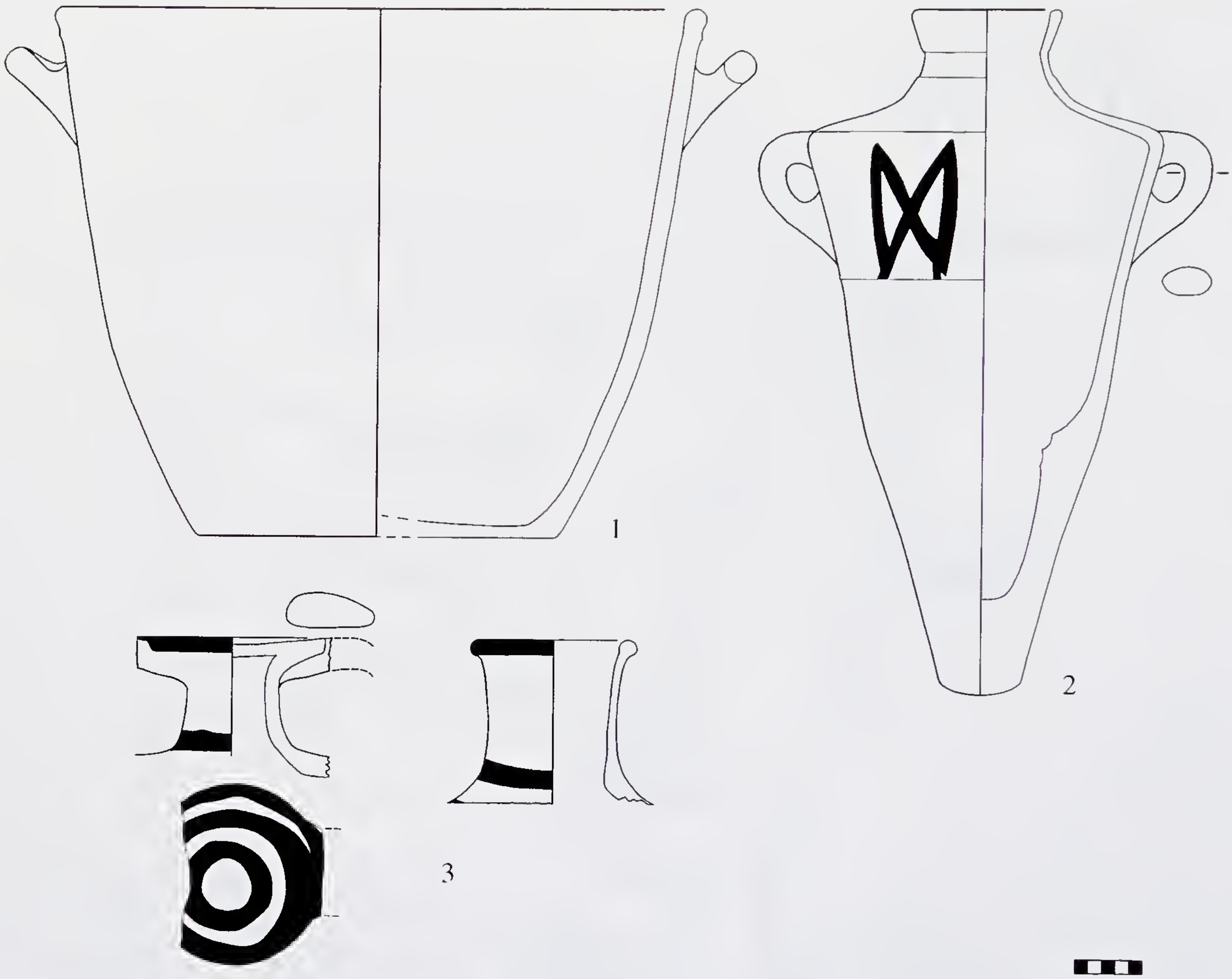

FIG. 3. Mycenae: South House Annex Room 1.

Room 4

Excavated in 1960; published in detail Chadwick 1962, 43–46 with plan and sections. Pottery FIG. 4. 1.

A well-appointed corridor room closed at each end linking the Causeway at the north to the ramp system of the Processional Way at the south.

Room 5

Excavated in 1960; described in detail in WBM 9 (from which the summarized accounts here of Rooms 5, 6, and 7 are taken). Pottery FIG. 4. 2–4.

This is a very small area, with no means of access except from above at the time of the destruction. The finds from it were few and exclusively from the fill, with nothing to suggest any function, but they do clearly indicate that, when it was destroyed, this was an empty space and not one filled as a foundation or containing rubble from the first disaster. Three building phases could be identified in this area. In the third period the area was closed off to the west

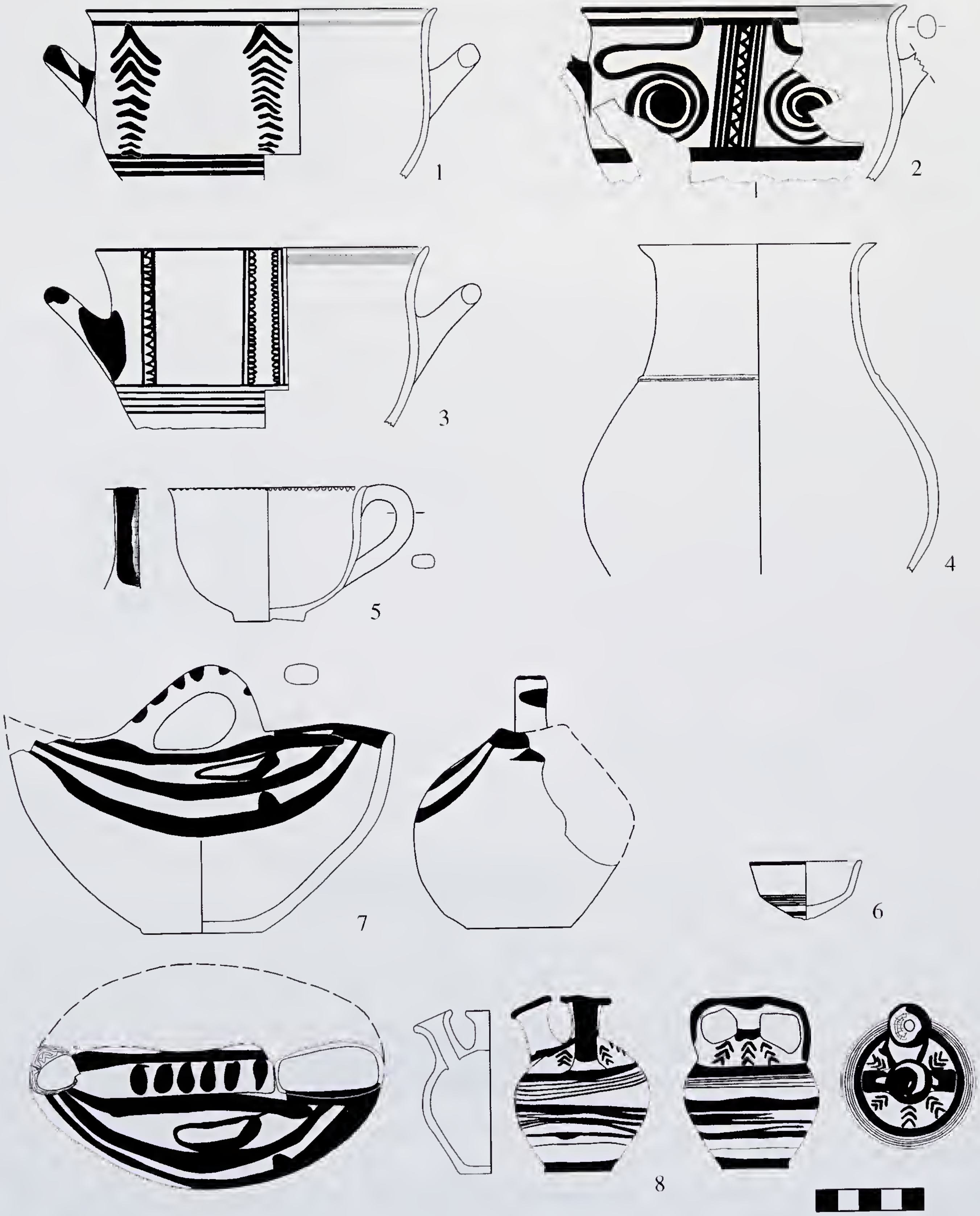

FIG. 4. Mycenae: South House Annex Room 4 (1); Room 5 (2–4); and Room 6 (5–8).

by a mud-brick wall. The building of this wall is to be attributed to Phase VIII and may have been necessitated by the collapse of the stair at the south end of Room 6 leaving a dangerous accumulation of rubble. This rubble became a hard calcined mass in the final burnt destruction and could not be fully excavated. The idea that there was a beaten earth floor belonging to Phase VIII at a much higher level seems to be disproved by joins in the pottery from the fill of the area. This fill is of a type comparable with the latest material found in the other rooms (60–325, FIG. 4. 2; 60–326, FIG. 4. 3). A figurine (60–224) confirms this date for the fill.

Room 6

Excavated in 1962; described in detail in WBM 9. Pottery FIG. 4. 5–8.

This is a corridor that seems originally intended to lead from the courtyard to the N, both via the passage Room 8, down to Room 7 and to the rooms above the South House and to the stair (9) leading to the roof and upper rooms of the Annex. The finds from Room 6, however, may indicate a function in Phase VIII more specific and elaborate than just a corridor, although it might have been merely a storage space for objects normally used in other areas, particularly the roof. Room 6 lies to the west of and parallel to Room 1. Like Room 1, its entrance was from the north but at a lower level down the slope. The corridor, as other areas, was filled with debris of heavily calcined mud-brick.

The cross wall was a later addition which must have been made not so long before the destruction of the area. Up against the south-west corner of it was found a miniature stirrup jar, (FIG. 4. 8) undamaged. Its significance in this position is unclear. A similar vessel was found higher up in the fill of Room 4 (Chadwick 1962, figs. 92–3).

Rooms 7, 7B

Excavated in 1962; described in detail in WBM 9. Pottery FIG. 5. 1–5.

Room 7 is the largest of the rooms in the South House Annex and the only one where the excavation showed clear traces of two storeys. The room could not be entirely cleared because it had been decided to preserve a LH III C terrace wall over the west part of the room as evidence of the history of the site. Particularly interesting was the evidence that was retrieved of varied building methods for both walls and floors/ceilings.

Many important finds came from excavating the main room, including some fairly complete pieces of pottery. It is not clear whether the objects from the upper fill came from the upper storey or possibly from shelves within the room itself. The similarity of the finds (including patterned wall plaster) which had fallen into Room 6 to those in 7 make it seem likely that the room above on floor 2 extended over the area of both 6 and 7. The shape of 7 is unusual and one is tempted to believe that it was not so designed originally. One possibility is that 7 was originally almost square and that damage occurred to the north-east corner at the end of VII.

South House

Partly excavated by Schliemann and further in 1920; Wace 1921/3, 86–96; reconsidered in WBM 9. Pottery FIG. 5. 6.

The entry to this large free-standing building lay at the north-east corner, leading into a long room from which three others opened to the south and beyond them two others. Almost

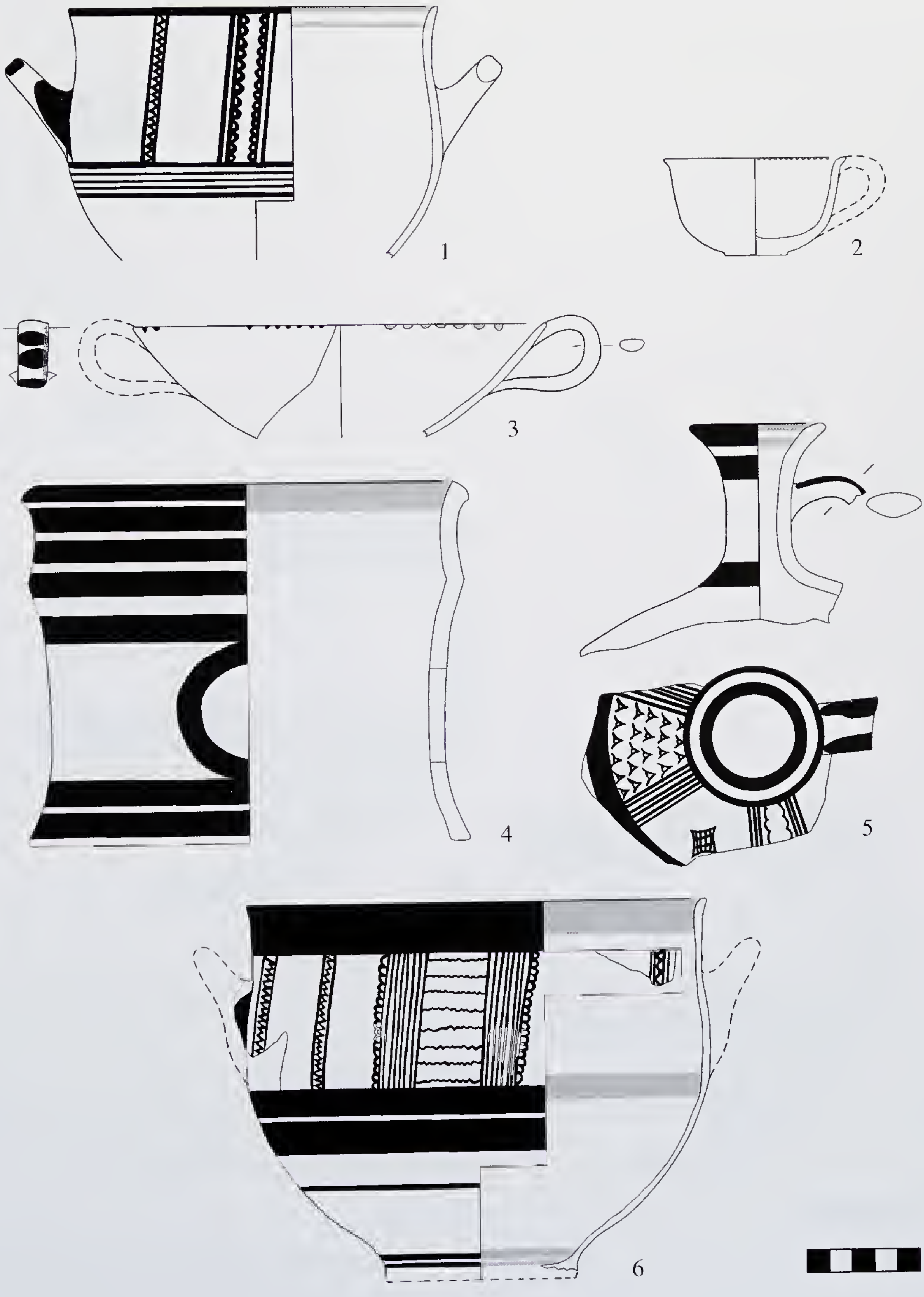

FIG. 5. Mycenae: South House Annex Room 7 (1–4), Room 7B (5), and South House Central Room (6).

no materials from the destruction levels were found. One pot (20–109) was registered from the Central (Pillar) Room. No further information about its find spot is given either in the notebooks or the publication. The pot seems from the photograph to be a classic example of type B but it is in fact a variant in several ways: inside there is a deep band below the rim and another band lower on the body as is normal in a stemmed bowl; the pattern is not symmetrical either side of the central triglyph but varies on both sides of the vase. Moreover, as the actual base is missing, it has, once at least, been drawn as a stemmed bowl although the reconstruction given here has been deemed more likely.

Thus as a whole the South House with the Annex has produced excellent evidence both for the date of construction of this complex and for its destruction, evidence that is both internally consistent and which agrees with that from adjacent areas. (This account of the date is taken directly from that to appear in WBM 9; it was written before 1989 and serves to document the history of the definitions presented here.)

The construction of the South House is dated by the pottery from the fill below the floor of Rooms 21 and 22, which has been published in detail by P.A. Mountjoy (1976). This pottery group is totally consistent with smaller groups from beneath the floors elsewhere in the building and can be assigned to mature LH III B1.

A *terminus post quem* for the destruction of the complex is given by the deposit of pottery published by K.A. Wardle (1973), which comes from rubbish fallen at the time of the destruction from the upper terrace onto the causeway leading into this building and corridor 4 at the north-east corner of the site. It therefore belongs to use in Phase VIII.

The actual pottery found in the final destruction debris of the South House and the Annex belongs to a pottery stage fractionally more advanced than that from the Causeway deposit, as is perfectly consistent with the contexts: destruction floor deposits contrasted with accumulated rubbish. The most noteworthy feature is the use on deep bowls of the system of linear decoration that is earlier associated solely with stemmed bowls. A few Group A bowls are also monochrome inside; others seem to show a stylistic divergence from a canonical example of Group B. This material belongs to the end of Phase VIII.

B. THE TEMPLE

Excavated in 1968 and 1969; fully published WBM 10 (esp. 2–3, 35).

Much of the pottery on the floors was of unpainted types that cannot be closely dated. The six Deep Bowls, however, are of considerable interest. Three are typical of Group B (a fragmentary example, 68–583, from the destruction level of Room 18, wrongly published as a Stemmed Bowl, and two from the destruction fill of Anteroom XI, 60–387, 69–506, WBM 10, fig. 4, phase 832). It should be noted that the inside of the base of 60–387 is so worn that no paint remains. This caused some considerable delay in finding the sherd during mending and the lack of base for 69–506 may result from a similar difficulty. The other three examples of Group A, one from each of Rooms 18, 19, and XI, show a distinctly flaring lip.

C. THE PASSAGE (34) AND SMALL COURTYARD (35)

Excavated in 1968 and 1969; fully published WBM 13 (esp. 31 and fig. 10, pl. 10). Pottery FIG. 8. 1–5.

The two deep bowls of the variant types with small rosette and with flaring rim, the linear deep cup and the decorated carinated kylix are typical of the end of Phase VIII.

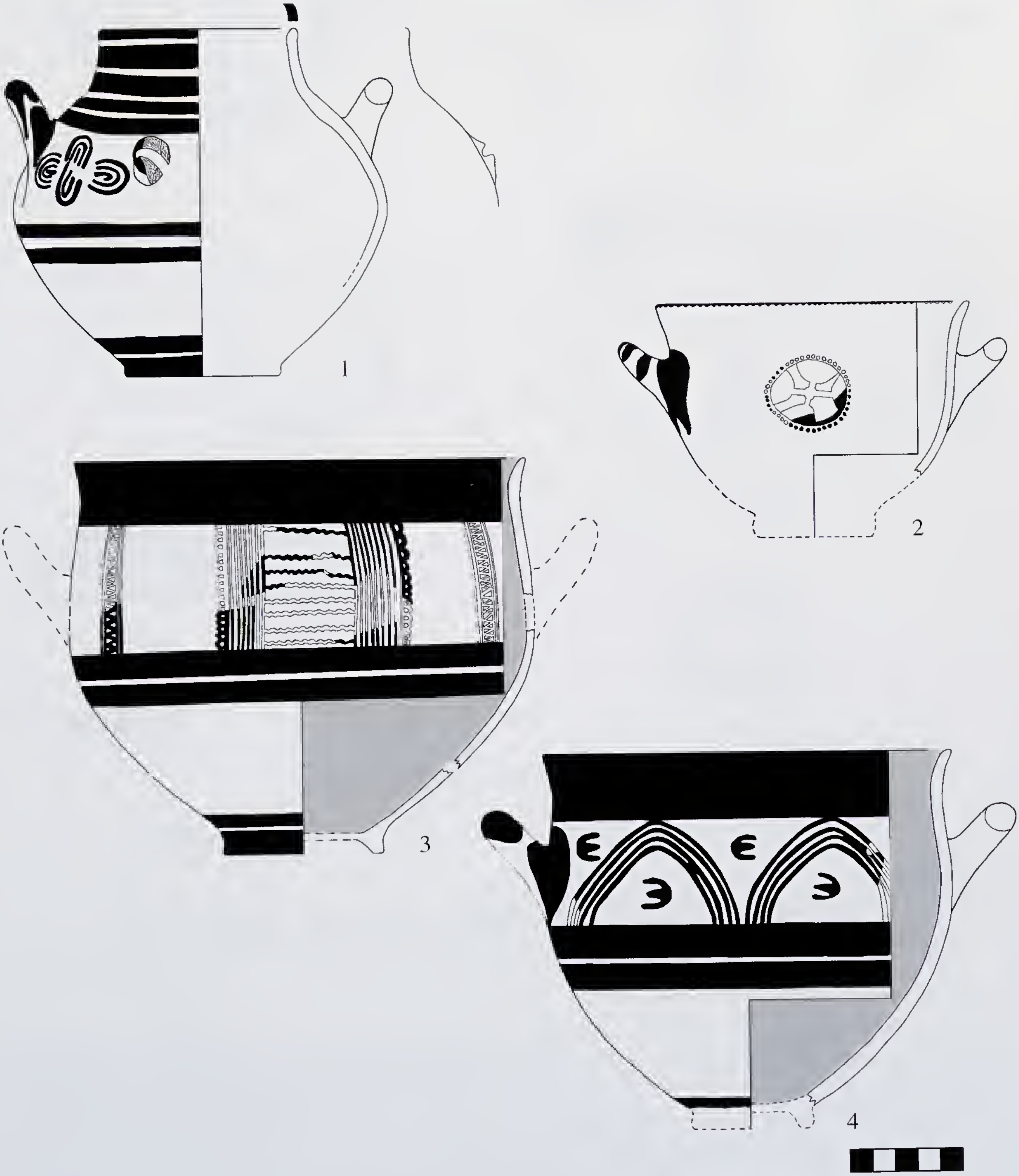

FIG. 6. Mycenae: LH III B2 Early examples from secure contexts West House (1), Causeway Deposit (2–4).

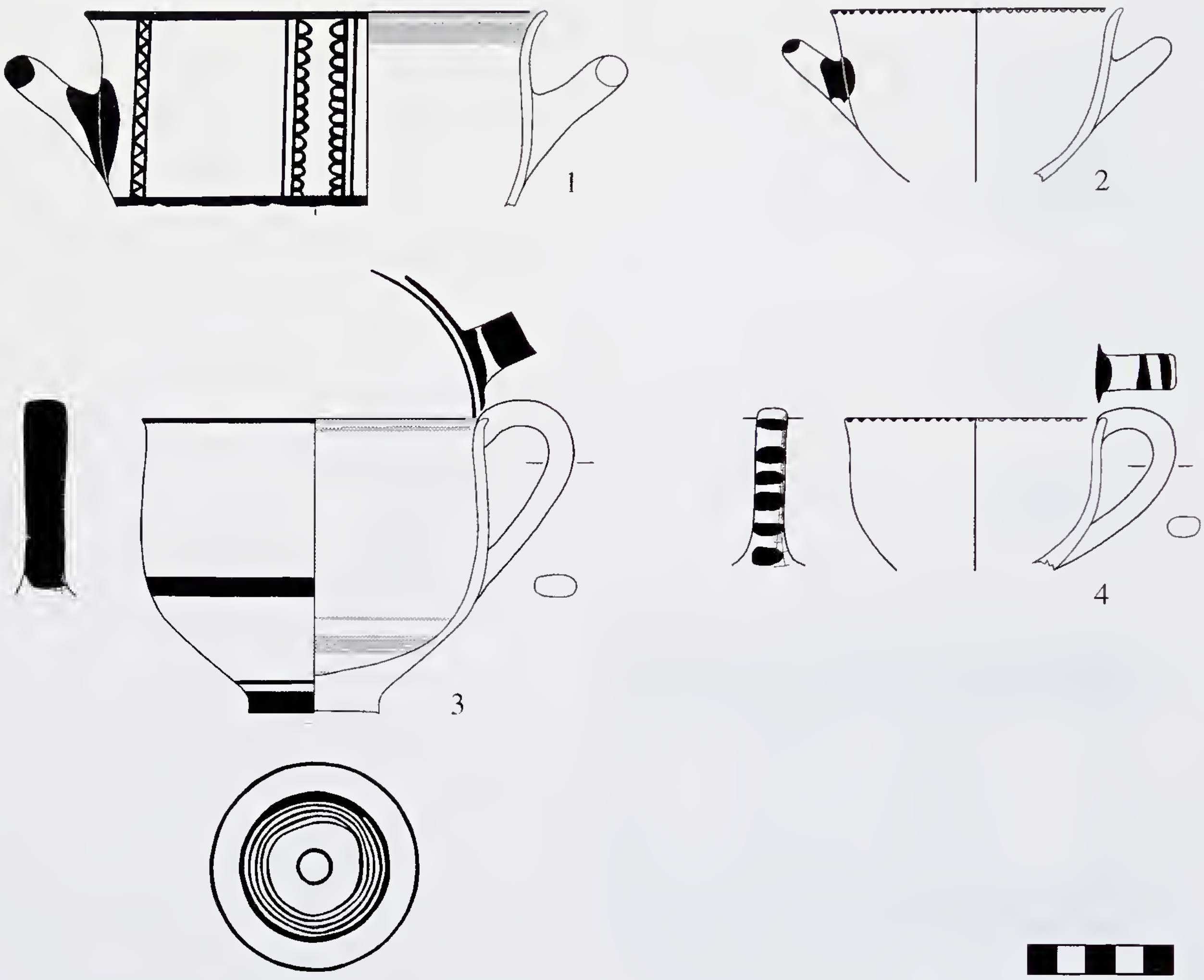

FIG. 7. Mycenae: Megaron Complex Room II.

D. ROOM XXIV

Excavated in 1966 and 1968; fully published WBM 13 (esp. 15 and fig. 10).

Notable here are the deep cup with dotted rim (FIG. 8. 6) and the large collar-necked jar.

E. THE NORTH-WEST QUARTER

This section of the work, under the direct supervision of the Archaeological Society, was published by Iakovides in 2006. The results are particularly relevant to our study. In the pottery summary (Iakovides 2006, 123–4 [in Greek], 176–7 [in English]) the presence of a variant deep bowl type A/B should be noted. Unfortunately the lack of pottery drawings makes further comparisons impossible.

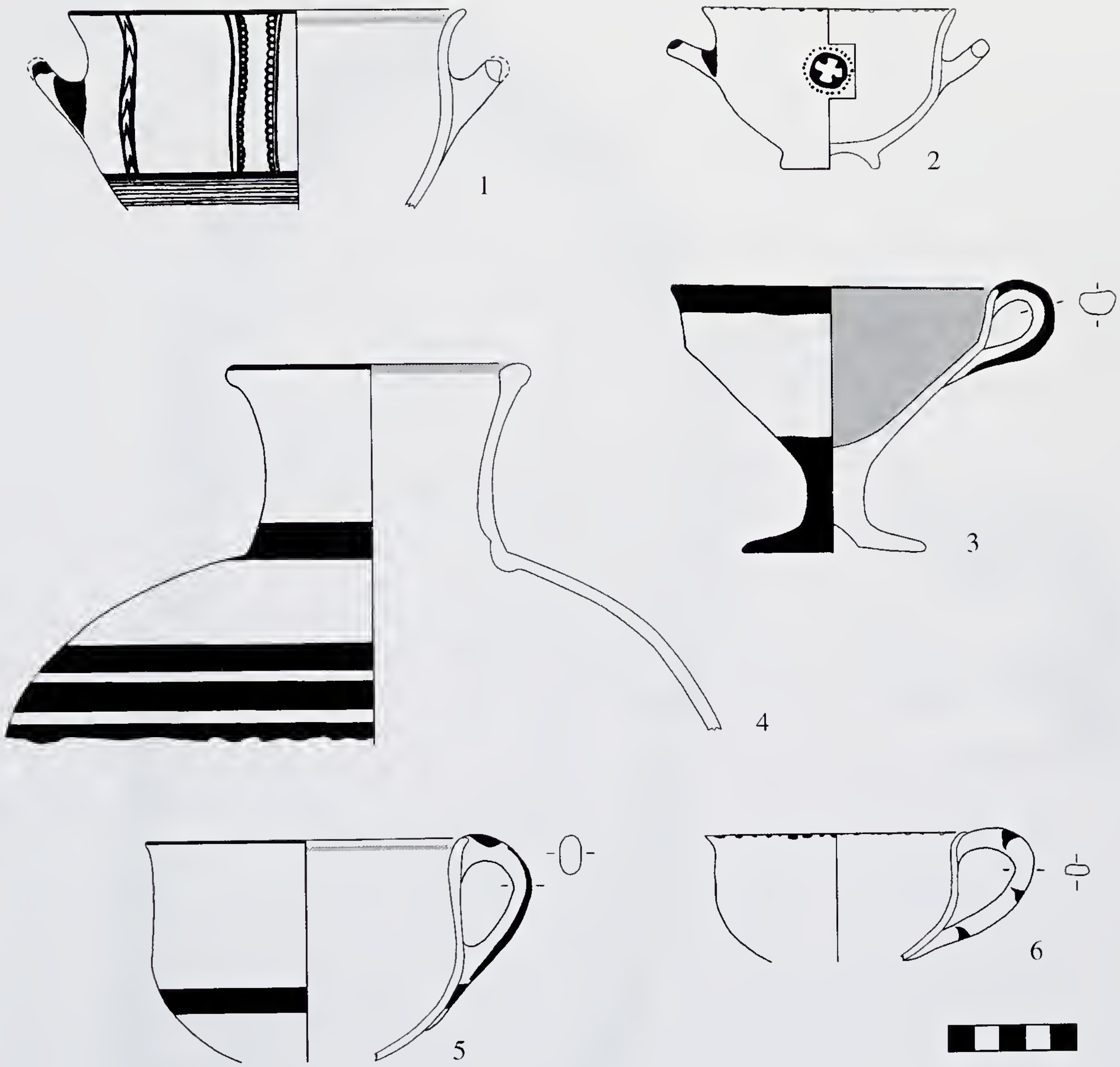

FIG. 8. Mycenae: LH III B2 Late examples from secure contexts Passage 34 (1–4), Small Courtyard 35 (5), and Room xxiv (6).

LH III B2 Late at Tiryns (fig. 9)
(By Ph. Stockhammer with a Contribution by U. Damm-Meinhardt)

In contrast to Mycenae, we are not yet able to give a state analysis of the LH III B2 Late contexts of the Unterburg at Tiryns, as these are still under study by Ursula Damm-Meinhardt, who took over the analysis of the Unterburg stratigraphy of the Palatial and Earliest Post-Palatial strata after the death of Klaus Kilian. She has continued working on the excavator's already completed stratigraphic tables (similar to Kilian 1988*a*, fig. 27 = Kilian 1988*b*, 120 fig. 2; Mühlenbruch 2005). This synopsis contains the last stage of Kilian's research on all

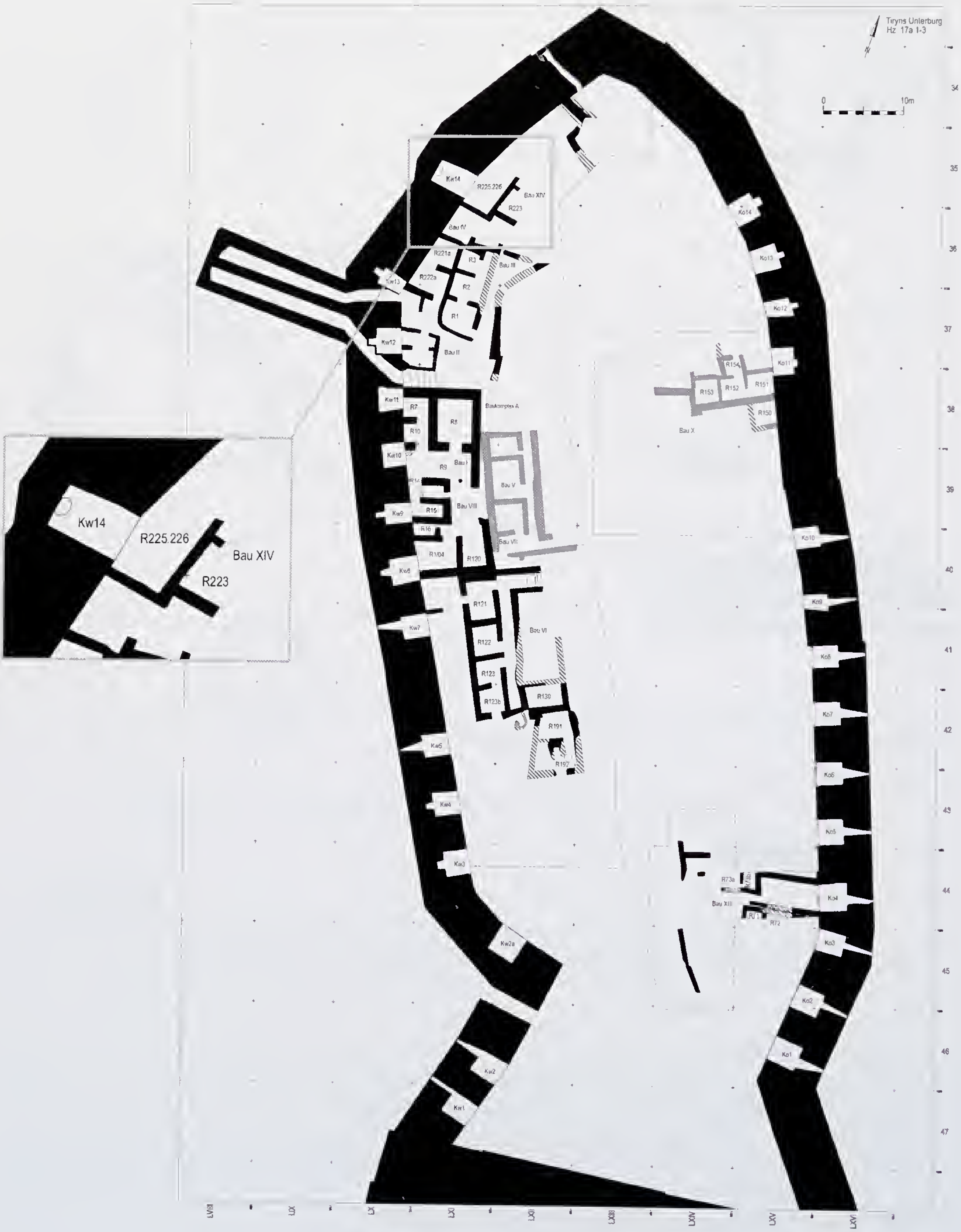

FIG. 9. Tiryns: Plan of the Unterburg in horizon 17a1–17a3.

buildings and other units in the Unterburg in the various subphases of SH III B and it thus forms a most important source of information.

Kilian merged the huge number of artificial strata excavated on the Unterburg into several architectural horizons, which comprise the building, use, destruction, and levelling of the rooms (cf. Kilian 1988*a*, 132 fig. 27 = Kilian 1988*b*, 120 fig. 2; Mühlenbruch 2005). However, although he based his phases only on architectural evidence, he often chose terms from the ceramic terminology to label his horizons (e. g. horizon 19 = LH III C Early). Kilian's use of ceramic terms for the architectural horizons of the late Palatial period, however, differs from the terminology currently used by archaeologists working in the Argolid. The pottery phase LH III B2 Early, as it will be defined in this article, equates with Kilian's architectural phase SH III B Mitte (horizons 16a0–7), our LH III B2 Late comprises his SH III B Entwickelt (horizons 17a0–3) and SH III B Ende (horizons 17a4–18). The Post-Palatial period on the Unterburg starts with our ceramic phase LH III C Early 1 in horizon 19a0.

As examples of the nature of the Tiryns evidence and the problems we currently face, we present two significant LH III B2 Late contexts of special importance, the Bau (Building) XIV and the well in Kw (casemate) 14 (cf. FIG. 9).

A. BUILDING XIV (ROOMS 223, 225, 226) (BY PH. STOCKHAMMER WITH A CONTRIBUTION BY U. DAMM-MEINHARDT)

Excavated in 1982–3; published by Kilian 1982, 397; 1983, 279, 297 fig. 19; 1988*a*, 113–14, 117, 121 with figs. 10 *d*, 15, and 17; described in detail in Damm-Meinhardt forthcoming. Pottery FIGS. 10–12.

The designation of Rooms 225 and 226 as Building XIV was not given by Kilian in the preliminary report (Kilian 1988*a*), but for the first time in his general plan in 1990. It has to remain an open question whether Kilian also wanted to include Room 223, lying higher than Rooms 225 and 226 on the terrace adjacent to the east as part of the same building, but Damm-Meinhardt has decided to include it. As Room 223 and the remaining higher terrace were not completely excavated, the total extent of Building XIV remains unclear. Building XIV was erected at the beginning of the architectural horizon SH III B Entwickelt, but only the Rooms 225 and 226 were still in existence in the later part of SH III B Entwickelt and in SH III B Ende.

Room 223

This partially excavated room is situated in the squares LXII 35/63–6 and LXI 36/10–LXII 36/25. Because of heavy erosion, the southern wall is badly preserved, and the northern and eastern walls have not been excavated. A floor was encountered in Oberfläche VII in the south-western part of the room. In Kilian's view, the use of Room 223 was very short-lived, probably restricted to the horizon 17a1, i. e. the beginning of the architectural phase SH III B Entwickelt, and, after being levelled, it was replaced by an open space. Besides the actual stratigraphy, this interpretation is based on his dating of the large quantity of restorable vessels found on the floor of this room. By the west wall there was a hearth with a large crushed lead cauldron (LXII 35/81–92). To the south Kilian documented several complete vessels, which probably fell down from some kind of shelf. Kilian (1988*a*, 117) mentions amphorae, medium-sized stirrup-jars, a narrow-necked jug and several unpainted kylikes. In the centre of the southern part of the room a pithos (LXII 36/4) and several other storage

1

2

3

FIG. 10. Tiryns: Unterburg, Room 223.

vessels as well as drinking vessels were found: vats, linear and undecorated jugs, a deep bowl, a mug with spiral decoration and a cup.

As the pottery from the floor of Room 223 was not stored by context and there are no photos or inked drawings available, most of these vessels from the floor context of this room await identification and illustration. We can attribute to the floor context the following vessels, of which drawings are stored in the Tiryns archive in Heidelberg or Athens or which could be identified in the storeroom at Tiryns (FIGS. 10–11):

From the vessels mentioned by Kilian to have fallen from some kind of shelf along the eastern wall: a narrow-necked jug FS 120 with linear decoration (FIG. 11. 3) and a medium-sized stirrup jar (FIGS. 10. 2).

From the vessels discovered by Kilian in the vicinity of the pithos (FIG. 10. 3): a small deep bowl with unusual decoration (FIG. 10. 1), another deep bowl (FIG. 11. 2), and a deep cup FS 215 with monochrome interior and linear decoration on the exterior (FIG. 11. 1). The mug FS 226 with spiral decoration has already been published (Kilian 1988*a*, 117, 121 fig. 17) (FIG. 11. 4).

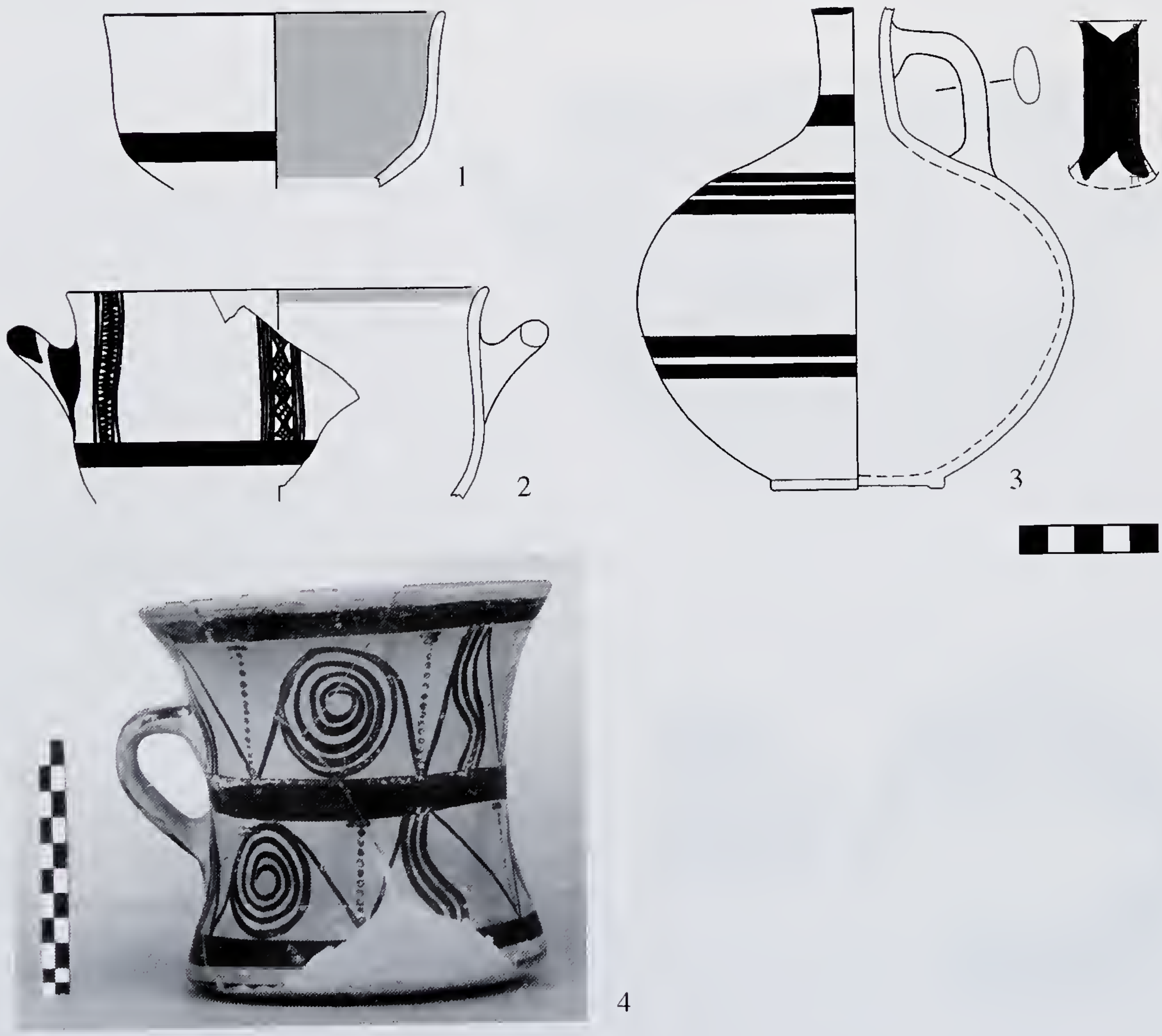

FIG. 11. Tiryns: Unterburg, Room 223.

Rooms 225, 226:

Because of later building activities, only the southern part of Room 225 in LXI 35/68–78 could be excavated. It stretched for at least 3.5 m along the Cyclopean wall. A Lauffläche was preserved only in a small part of the room (0.8 × 1.4 m). A doorway connected Room 225 with Room 226 to the south. Room 226 (LXI 35/77–90; LXI 35/96–LXI 36/09), with a north–south-extension of 2.25/30 × 2.90/3.30 m, was probably used as passage down to the casemate Kw 14. Two phases of use can be postulated for the building (see Kw 14).

B. KW (CASEMATE) 14 AND WELL (BY PH. STOCKHAMMER WITH A CONTRIBUTION BY U. DAMM-MEINHARDT)

Kw 14: excavated in 1980–1983; published Jantzen 1969, fig. 1; Grossmann 1980, 479 fig. 2; fig. 6; 485, 487 fig. 10; Kilian 1982, 397; 1988*a*, 111, 113–19 with figs. 10 *d*–15; 149; described in detail in Damm-Meinhardt forthcoming. Pottery FIGS. 13–17.

Situated in the squares LXI 35/43–67 and LXI 35/62–86, the northernmost casemate, Kw 14, is the the biggest and best preserved one in the Unterburg. It shows a rectangular layout

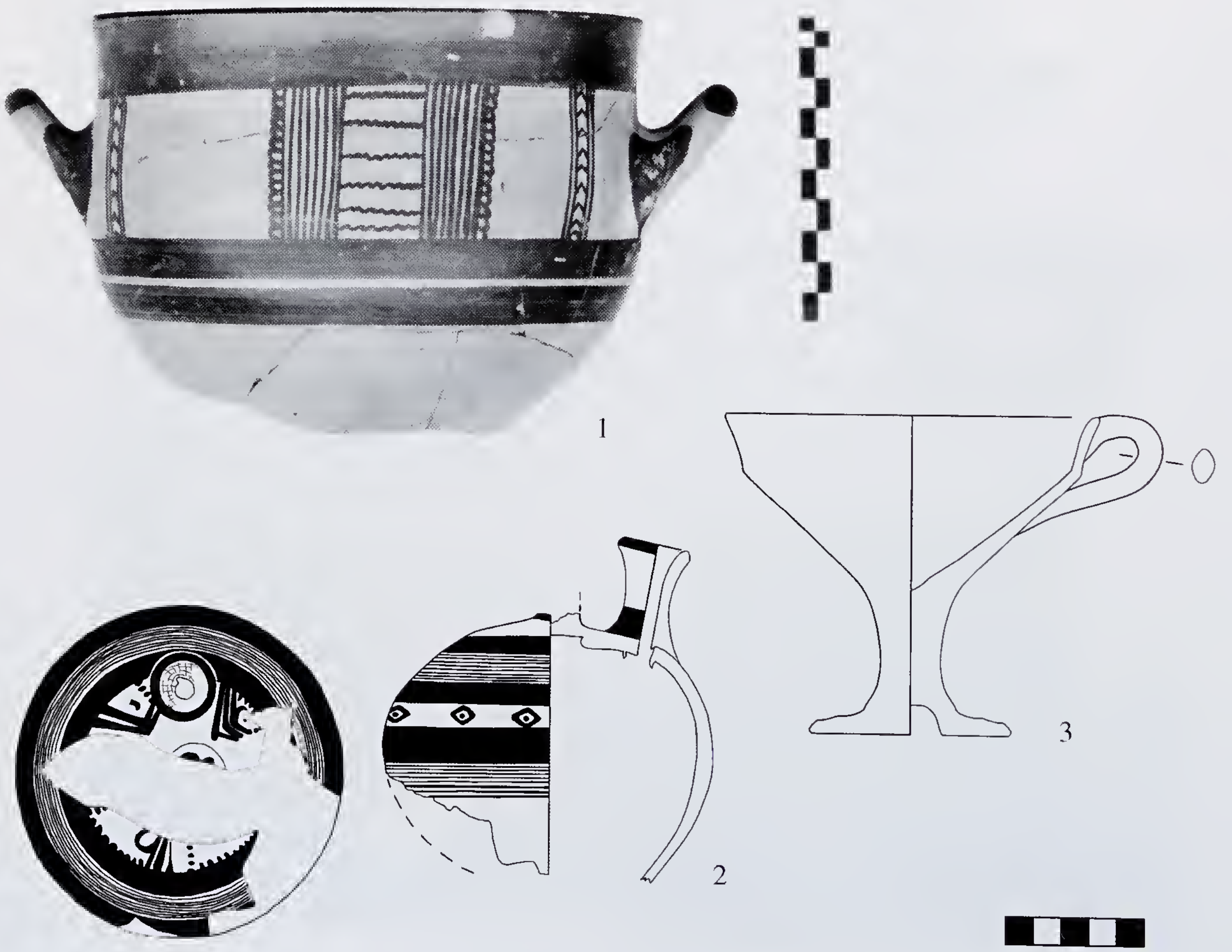

FIG. 12. Tiryns: Unterburg, Rooms 225, 226.

with a west–east-extension of 4.70 × 3.10–3.30 m and a height of 6.80 m. It was first documented by Jantzen in 1968. The Mycenaean strata were excavated together with the adjacent Rooms 225 and 226 by Kilian in 1980–3. In order to give a north–south section, Kilian divided the casemate into an eastern and a western part (borderline: LXI 35/56, 66, 75, 85), which were excavated separately down to Oberfläche XIVa. Within the casemate Kilian was able to identify an undisturbed sequence of eleven different floors ranging from SH III B Entwickelt until SH III C Spät. From the bedrock of the casemate a well with a diameter of 1.55–2.20 m was sunk 10 m into the rock down to the level of the groundwater. It is situated in the centre rear part of the casemate (LXI 35/53.54.63.64.74). During the use of Building XIV in the Palatial period the casemate Kw 14 remained open for a long time. Only after the well had been filled was a cross wall built blocking the entrance. For architectural reasons, but probably also on the basis of the pottery from the fill, Kilian (1988*a*, 114) dated the sinking of the well earlier than the construction of the Citadel wall in SH III B Entwickelt, which he thought was built around the well. He considered the filling to have occurred shortly after but still in SH III B Entwickelt, as he dated the pottery of the filling to SH III B Mitte (Kilian 1988*a*, 114). Jacob-Felsch (1998, 123) rejected Schönfeld's and Kilian's dating of the pottery from the well to SH III B Mitte. In her view the pottery can only be dated generally to LH III B. Like Kilian, she dated the construction of the Cyclopean wall after the filling of the well, which she placed at the end of LH III B without further elaboration. On the basis of this evidence, she saw the construction of the Cyclopean wall at the beginning of the Post-Palatial period (Jacob-Felsch 1998, 117, 123, 125; cf. Jacob-Felsch 2000, 67–8 for a slightly different view of the history of the citadel walls). However, recent re-evaluations of the architecture and stratigraphy of the casemate by Damm-Meinhadt, and especially of the pottery from the well by Stockhammer, have led to a redating of the filling of the well. The casemate was probably built as a well chamber in SH III B Entwickelt and the well sunk after the construction of the casemate and not filled before, as Kilian, Schönfeld, and Jacob-Felsch thought. Two phases of use could be differentiated in casemate Kw 14 and Rooms 225 and 226 connected to it. The older Lauffläche was encountered in Oberfläche XV within the casemate and seems to have been used for quite a long time (horizons 17a1–5; *contra* Kilian 1988*a*, 114). No restorable vessels connected with this Lauffläche were found. The later Lauffläche in Oberfläche XIV covered the well, which had already been infilled, and is itself covered by the debris of the destruction of the Unterburg at the end of the LH III B (horizon 18). Therefore, the well was in use in the architectural phases SH III B Entwickelt and SH III B Ende and filled shortly before the destruction of the Unterburg at the end of the Palatial period; consequently its fill (Abhübe XIVc–s) started and ended within the pottery phase LH III B2 Late.

The pottery from the fill comprises several complete or fairly complete vessels (FIGS. 13–17). In contrast to the fill of the well of the Acropolis fountain in Athens (Gauß 2003, 99 figs. 1–4), most of the vessels from the fill were open vessels, i.e. deliberate fill. Some of the closed vessels (jugs) may have been lost in the well during the time of its use (FIG. 17. 1–2). It must remain open to question whether we are confronted with the ceramic rubbish of a single or of several households dumping waste into the well after its abandonment. Fragments of a pictorial krater with a stag scene found at different depths (FIG. 16. 2) show the rapidity of filling. In his preliminary excavation report (Kilian 1988*a*, 114) and a report to the Deutsche Forschungsgemeinschaft (Kilian, TSS from 1983, stored in the Tiryns archive in Heidelberg),

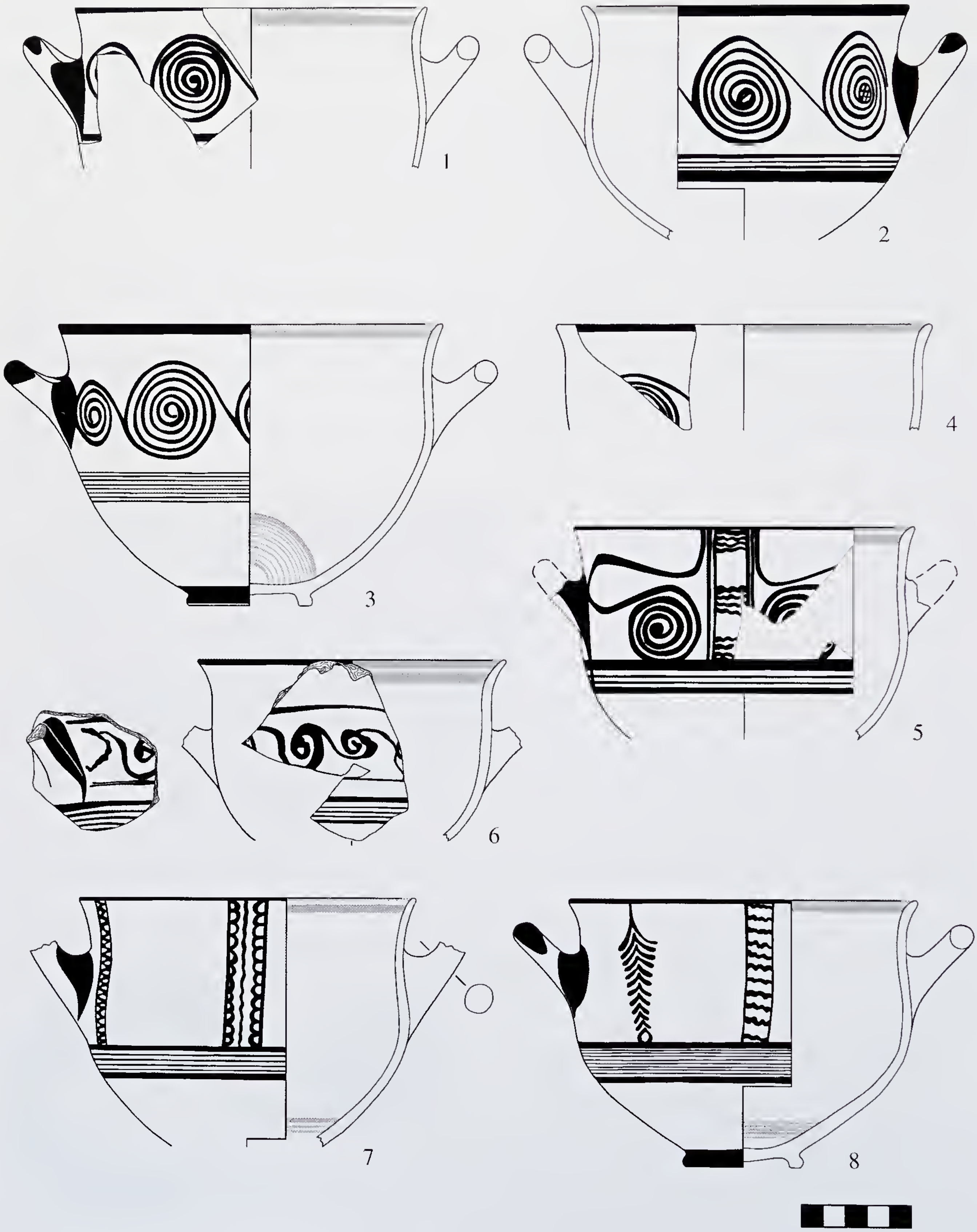

FIG. 13. Tiryns: Unterburg, Kw 14.

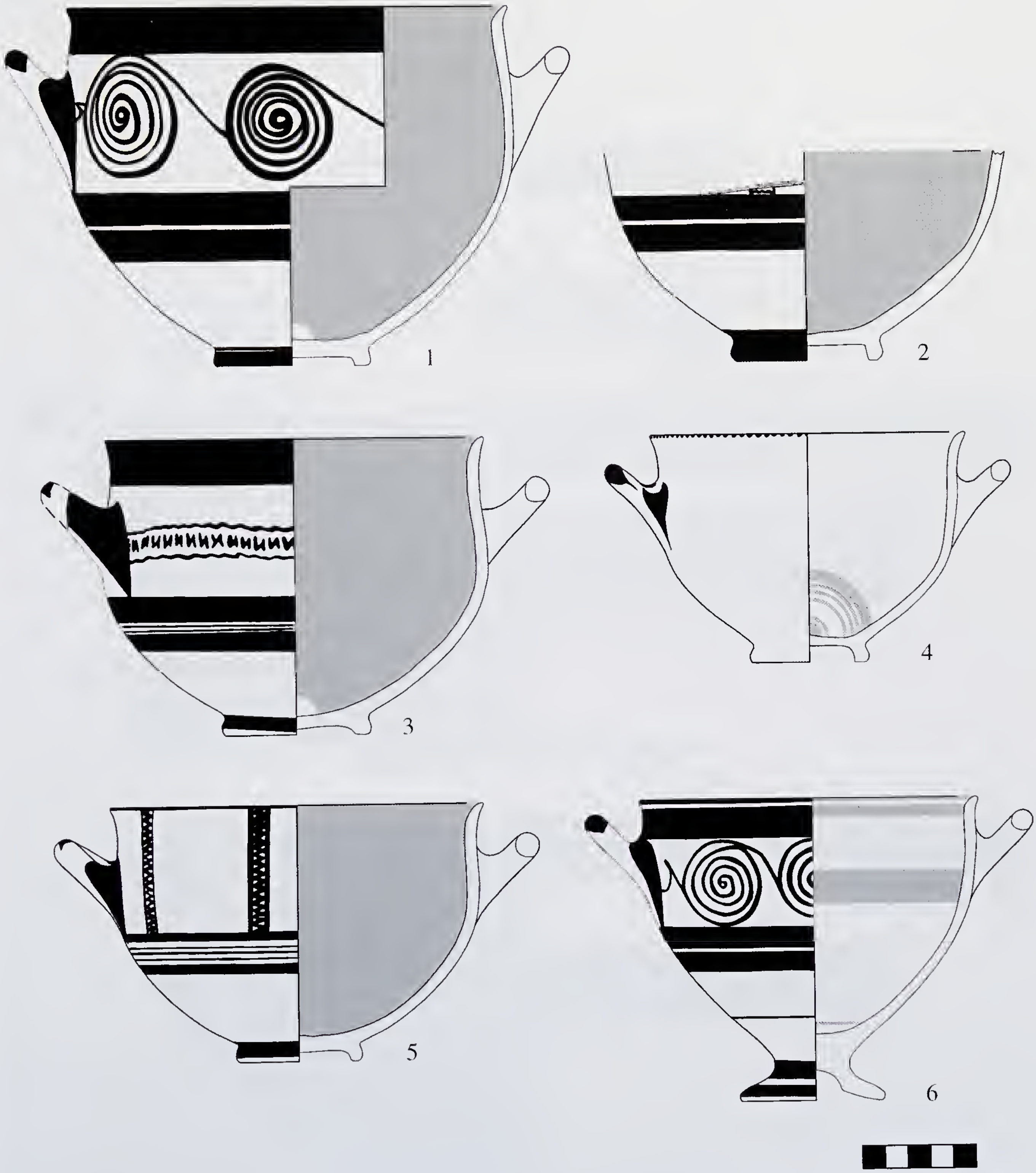

FIG. 14. Tiryns: Unterburg, Kw 14.

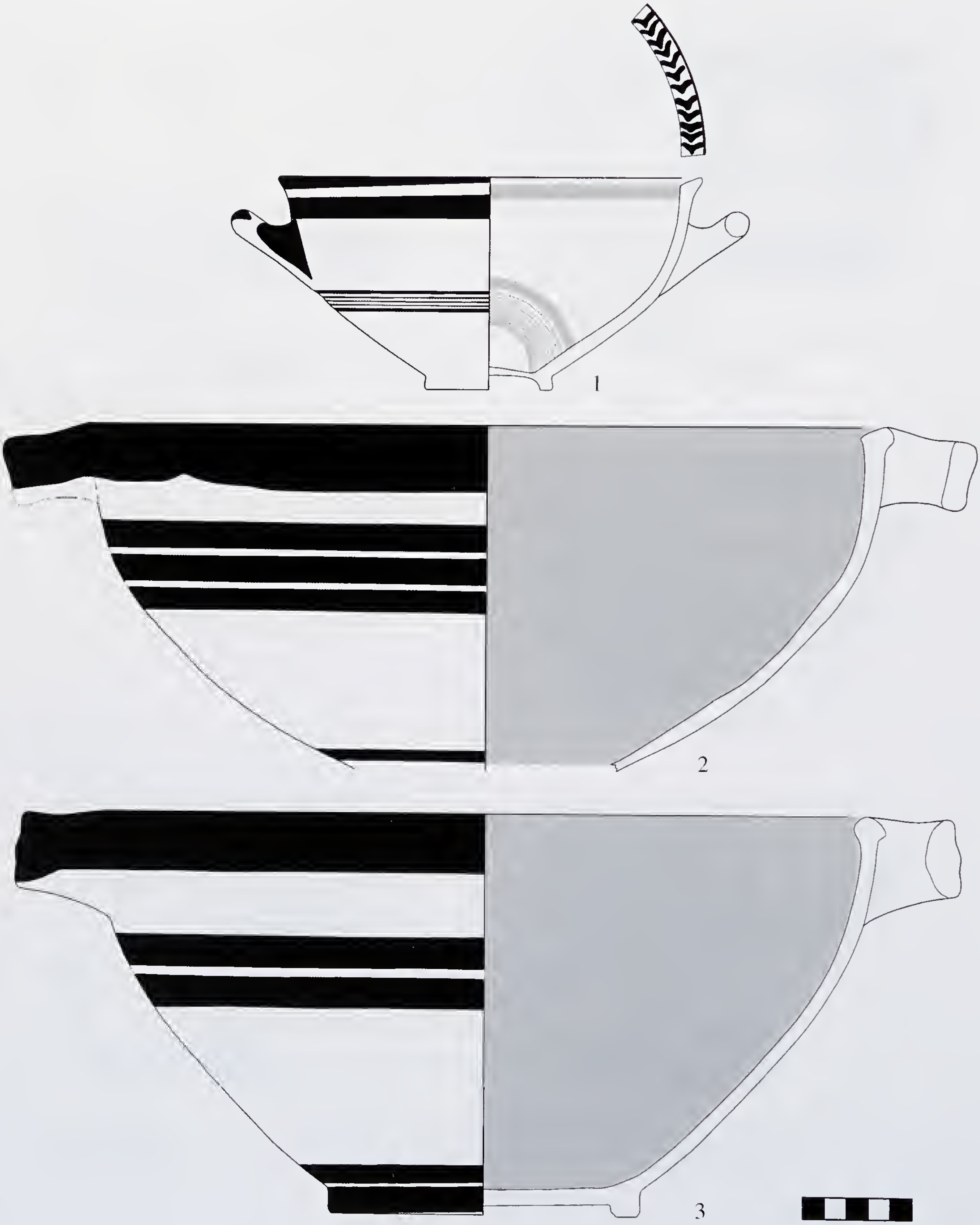

FIG. 15. Tiryns: Unterburg, Kw 14.

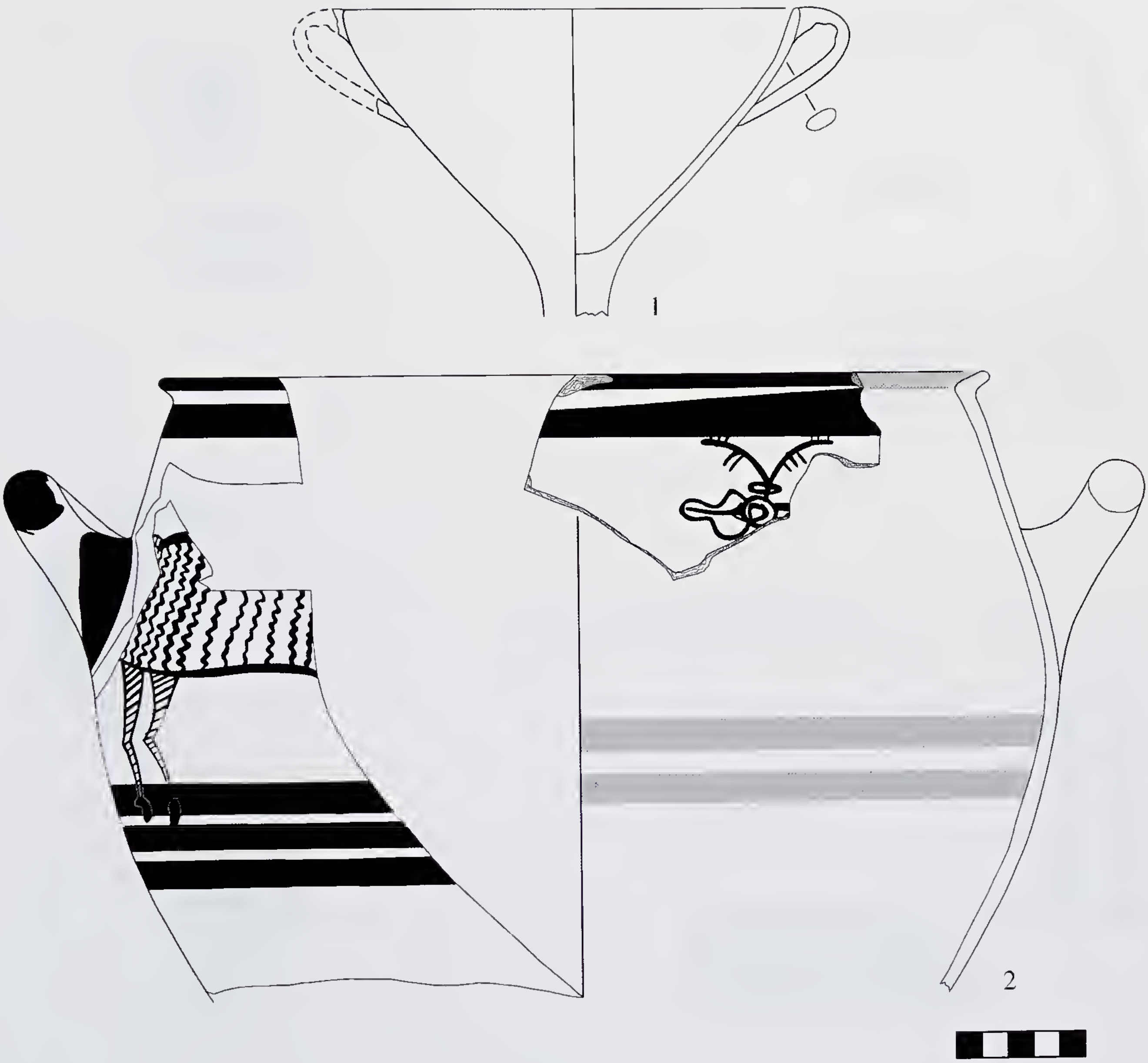

FIG. 16. Tiryns: Unterburg, Kw 14.

Kilian mentions ten restorable deep bowls, three large basins with monochrome interior, small jugs, a Handmade Burnished cup and a bowl in gray ware (Kilian 1988*a*, 116 fig. 12; 118 fig. 13; 119 fig. 14; 131 fig. 26, 21), but does not discuss the great quanity of sherd material from the fill. On the basis of his preliminary report and the drawings stored in the Tiryns archive in Heidelberg we are able to identify most of the restorable vessels (FIGS. 13–17). A small stirrup-jar (FIG. 17. 4) is illustrated by Kilian (1988*a*, 116 fig. 12. 2), but not mentioned in the reports. The great quantity of pottery from the fill is still waiting to be studied.

The most advanced features of the pottery from the well are the very slightly hollowed lip of a linear jug (FIG. 17. 2) and the reserved circle on the bases of two of the deep bowls with

FIG. 17. Tiryns: Unterburg, Kw 14.

monochrome interior (FIG. 14. 1, 3). The linear shallow rounded bowl FS 295B (FIG. 15. 1) could be the first evidence of this type in Tiryns.

Although Kilian does not mention vessels found *in situ* on the later Lauffläche after the abandonment of the well on the floor of Kw 14 or Rooms 225 and 226, a photograph in the Tiryns archive clearly shows that at least two restorable vessels were found lying on the floor of Room 225 in Oberfläche XIVa (Photo 1983, film 13, no. 13). One of the two vessels can be identified as a classic type B deep bowl (FIG. 12. 1). Moreover, a restorable small globular stirrup jar with flower decoration on its shoulder (FIG. 12. 2) and a complete unpainted

carinated kylix (FIG. 12. 3) have been drawn from horizon 18 inside Room 226. Because of their state of preservation, they might be attributed to the floor of the room. An accumulation of sherds, probably the substructure of a sherd-hearth, was discovered at the north-eastern edge of the casemate Kw 14 (LXI 35/56.66 Nr. 9 Ofl. XIV), which again was covered by the debris of the destruction of the latest buildings of the Palatial period (horizon 18).

ALTERNATIVE METHOD OF STUDY (BY PH. STOCKHAMMER)

The state of documentation outlined above has made it necessary to proceed with an alternative methodology, which had already been applied to identify the 'type fossils' of LH III C Middle 2 and LH III C Late on the Unterburg (Stockhammer 2008; Stockhammer forthcoming).

The first stage was to undertake a critical assessment of the different systems of chronology for LH III B2 and then to characterize the features that might be used as diagnostic for LH III B2 Early and Late (Stockhammer 2008). Out of the huge corpus of drawings stored in Athens, several thousand were inked, photocopied and brought to Heidelberg to be stored in the Tiryns archive there, where they were re-sorted into contexts.

Making the assumption that all vessels preserved to a significant extent would have been drawn and with our list of features in hand, the many pottery drawings in the publications of Kilian (1979; 1981; 1982; 1983), Schönfeld (1988), and Podzuweit (1979*a*; 1981; 2007) as well as the drawings stored in the Tiryns archive in Heidelberg were searched. We tried to identify all vessels displaying one or more of the features considered relevant for our analysis.

The find contexts of these pots were checked afterwards on the basis of Damm-Meinhardt's stratigraphic analysis of the Unterburg. In this way, we aimed to determine the first appearance of certain features in its layers.

It must be realized that this approach will give a slightly different result from that of floor deposits such as those from Mycenae. In particular it must be remembered that some information is missing as only some of the vessels in question have been examined first hand. Moreover, it has not been possible to check all the drawings and information on the fabric does not exist in every case.

The following features have been identified in this way:

Unterburg horizon 16 (architectural phase SH III B Mitte)

(*a*) *Closed vessels.* Small collar-necked jars FS 64 were found in horizon 16 for the first time (FIG. 18. 1). Schönfeld (1988, 155 table 1 no. 83; 195 fig. 10, 4. 8; 1997) assigns the start of this feature to horizon 16a1.

(*b*) *Deep bowls.*
(1) Secure evidence: rosette deep bowls with dotted rim appear with horizon 16a1 on the Lower Citadel for the first time and become very common in the course of horizon 16 (FIG. 18. 2), i.e. the architectural horizon SH III B Mitte (Schönfeld 1988, 155 table 1 nos. 88–9; 155 table 2 no. 2 nos. 93–4; 177 fig. 6. 1, 3, 4, 8, 11; 182, 196, 203 fig. 12, 2).

There is no certain evidence for type B deep bowls in horizon 15, despite what Schönfeld (1988, 174) alleges. The only evidence presented and illustrated by him was found in strata under the Dörpfeld excavation in 1905 (Schönfeld 1988, 159 fig. 1. 1: LXI 43/80 XXc). According to Damm-Meinhardt (pers. comm.) this fragment has no good stratification. The

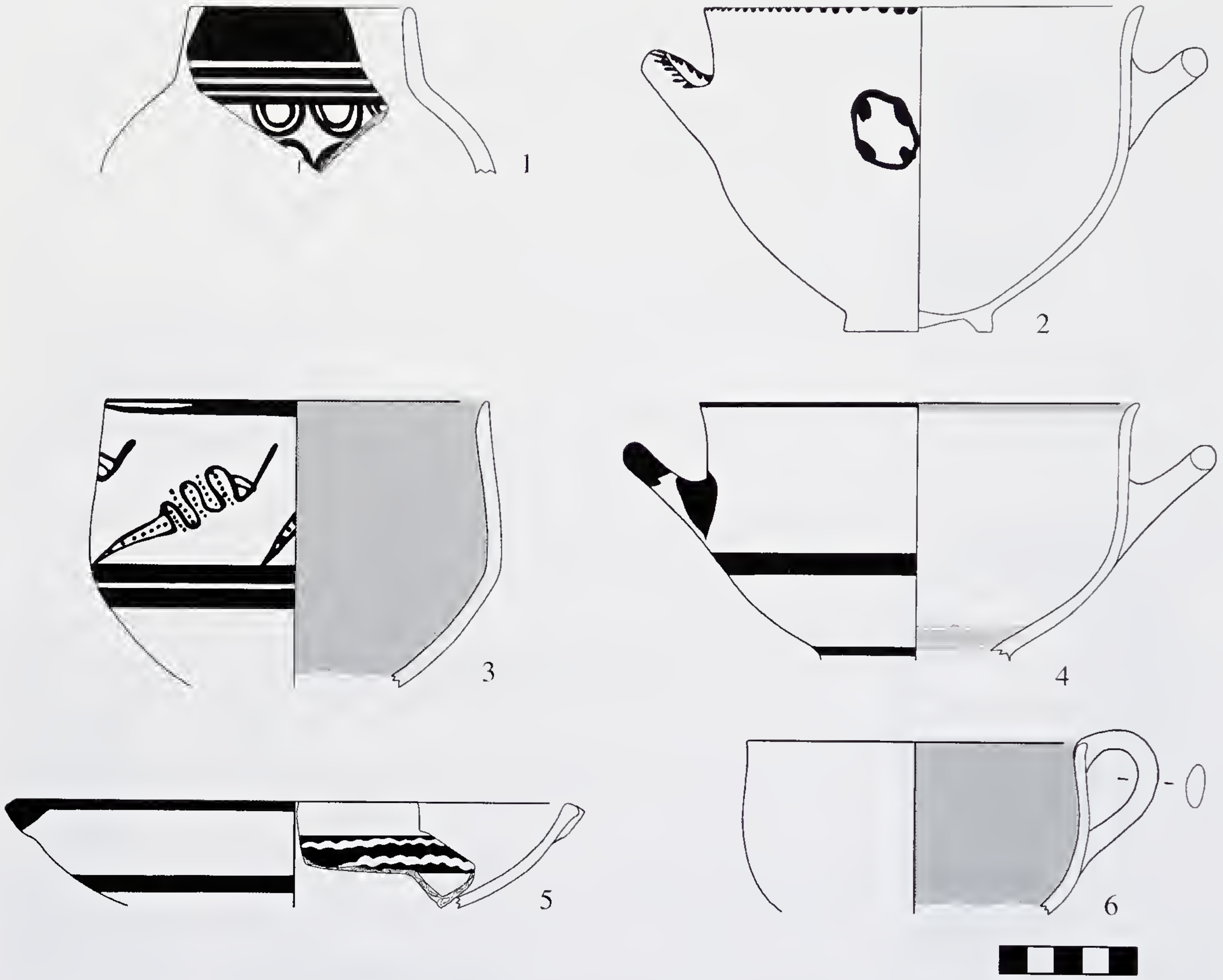

FIG. 18. Tiryns: Unterburg, LH III B2 Early examples from secure contexts.

depth of the fragment points to a stratum of possibly LH III A date. However, a disturbance from early excavations is very probable. From the same square but from a slightly deeper stratum (LXI 43/80 XXII) a stemmed bowl in heavy style is illustrated by Schönfeld (1988, 159 fig. 1. 18) and is taken by him as a further argument for the early start of features, commonly dated to LH III B2. However, one wonders about both these exceptional pieces, which give early evidence for these features and were found in the same square below the old excavation. In our view, there is no doubt that the stratum has been disturbed by the early excavation. Furthermore, the type B deep bowls with their characteristic broad triglyphs with half rosettes appear suddenly and frequently in horizon 16 (FIG. 21. 6; Schönfeld 1988, 155 table 1 no. 60; 155 table 2 no. 2 nos. 92, 97).

(2) Problematic evidence: in addition there is possible early evidence for deep bowls type A/B in this horizon. A deep bowl with monochrome interior and narrow rim band and two lower bands on the exterior (FIG. 18. 3), dated by Schönfeld to horizon 15, is not so clearly stratified as he claims (Schönfeld 1988, 174), but may derive from horizons 15a2–16a4 (Damm-Meinhardt, pers. comm.). There is also no information on fabric and a parallel might be

found in an example imported to Mycenae (Mountjoy 1976, 88 fig. 6. 45; 89 no. 45). In the following horizon 17, deep bowls A/B are very common. One example from the fill of the well in Kw 14 is illustrated (FIG. 14. 5), another one was found under the floor of Room 10, Building I, in horizon 17a2 and in the debris above the floor in horizon 17a4 has been published by Podzuweit (2007, pl. 7, 3) (FIG. 19. 2).

According to Schönfeld, we also have evidence for the linear deep bowl in horizon 16a3 with at least one reasonably preserved vessel (FIG. 18. 4). However, it remains unclear from Schönfeld's report whether this vessel is the only evidence of this feature, as Schönfeld does not differentiate between patterned and linear painted vessels in his chronological order of the types of linear decoration. As we have not handled this particular deep bowl from Tiryns, we are not able to decide whether the state of preservation of the vessel totally excludes the original presence of patterned decoration. A reworking of the Schönfeld material may answer these questions. Therefore, although this feature might start in horizon 16, the exact determination of its first appearance remains problematic. There is no doubt that such deep bowls are present in horizon 17, as a restorable linear deep bowl with monochrome interior and only linear decoration on the exterior (Podzuweit 2007, pl. 19. 6: LXI 41/78 XI) was found between the debris and the last floor (horizon 17a4) in Room 121, Building VI, in SH III B Ende.

(*c*) *Shallow bowls.* There is frequent evidence for shallow, linear bowls FS 296 with white paint applied on the interior bands in horizon 16 (FIG. 18. 5; Schönfeld 1988, 155 table 1 no. 59; 193 fig. 9, 11. 13. 16). The earliest evidence of this form quoted by Schönfeld (1988, 190) in horizon 15 shows no added white on the interior and cannot be taken as a representative of this type fossil. It is of interest, that bowls of very different rim and handle types show the added white on the interior bands as the only common element (cf. Podzuweit 2007, pl. 38. 1–10).

(*d*) *Cups.* Rather surprisingly deep cups FS 215 with monochrome interior and unpainted on the exterior may already be present in horizon 16. A cup of this kind is illustrated by Schönfeld and can be attributed to horizon 16a3 in Tiryns (FIG. 18. 6). In his schedule of forms, Schönfeld (1988, 155 table 1 no. 30) gives the start of this feature in horizon 15. However, as he does not illustrate these fragments and as the cup illustrated by him comes from horizon 16a3 (which, according to him, does not present this feature) the beginning may be assumed to lie in horizon 16 until the Schönfeld material can be restudied. However, an earlier start of this feature cannot be totally excluded.

It is possible that linear cups also began this early but there is no evidence at present available from Tiryns. However, Room II under Megaron 2 at Mycenae, where the fill is probably connected with the earthquake destruction in 'mid LH III B' (= end of Phase VII in the Citadel House Area), contained a nearly complete linear cup FS 215 (62–0460, FIG. 7. 3) and a cup with dotted rim and barred handle (62–543, FIG. 7. 4) among other vessels.

Unterburg horizons 17–18 (architectural phases SH III B Entwickelt and Ende)

(*a*) *Closed vessels.* Linear painted, closed vessels with slightly hollowed lip have so far been considered to appear for the first time in LH III C Early. However, there is clear evidence from Tiryns that this feature starts in horizon 17, as the vessel illustrated by Podzuweit (2007, pl.

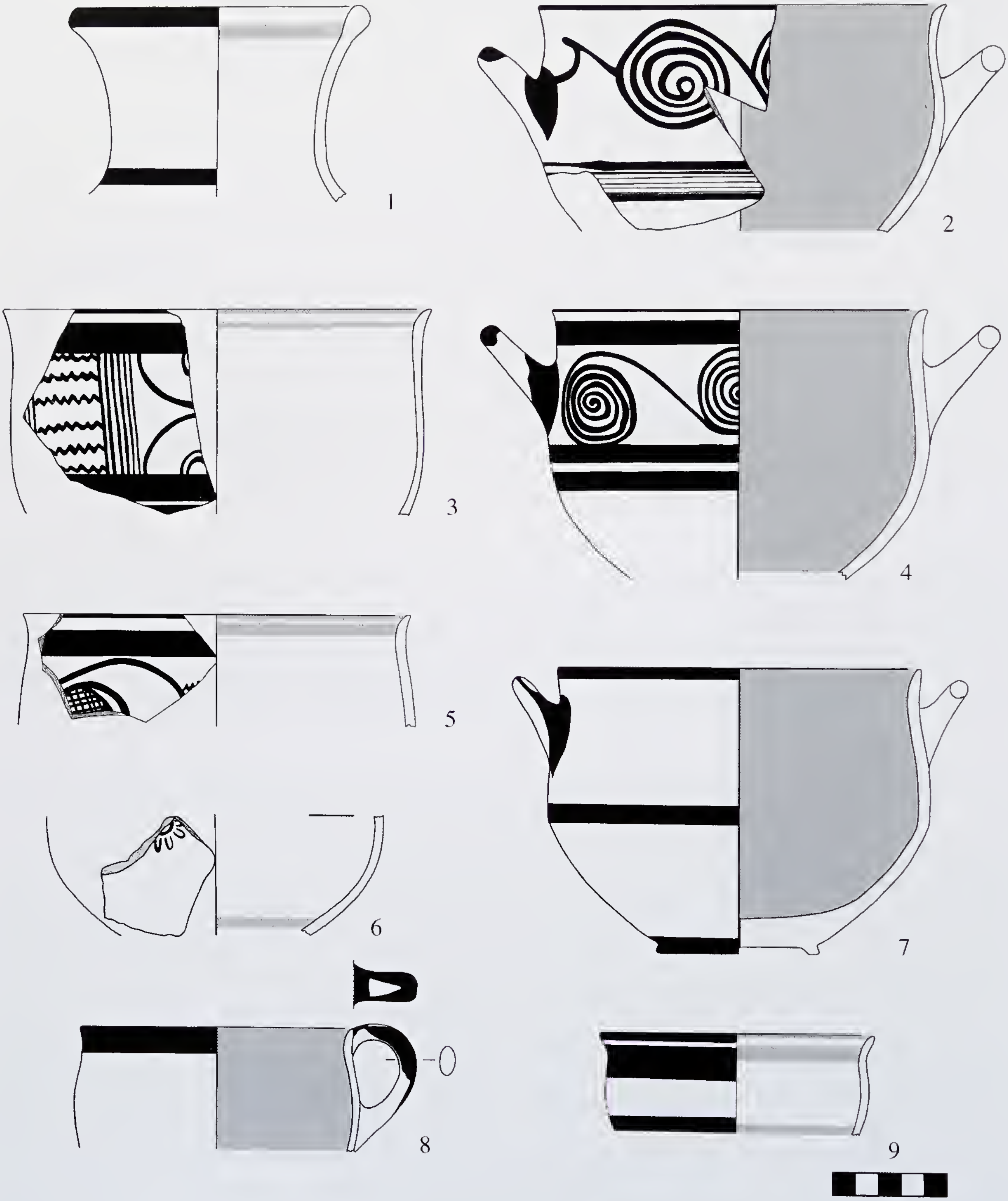

FIG. 19. Tiryns: Unterburg, LH III B2 Late examples from secure contexts.

103, 2) was found in Room 15, Building VIII, in a context (LXI 39/71 XV) assigned to 17a2–4 by Damm-Meinhardt (FIG. 19. 1). A linear jug from the fill of the well in Kw 14 also shows a very slightly hollowed lip (FIG. 17. 2).

(*b*) *Deep bowls.* The earliest evidence for deep bowls with monochrome interior with reserved circle in the base can be found in the fill of the well in Kw 14 described above in detail (FIG. 14. 1, 3). There is also evidence for this feature from the Epichosis (Voigtländer 2003, 97 pl. 69, Si 169–71).

Deep bowls showing an incipient stage of curving profiles are already common in horizon 17, as some of the restorable deep bowls from the fill of the well in Kw 14 clearly illustrate (FIG. 13. 2, 7–8).

Deep bowls with stemmed bowl banding also appear in horizon 17. This is shown by deep bowls from the fill between the two floors of Room 10, Building I, in horizon 17a2 (FIG. 19. 5), from the strata of horizon 17a3 in the Zwinger (FIG. 19. 3) and from the debris of the earthquake destruction at the end of the Palatial period in Room 123, Building VI (FIG. 19. 4).

The linear rosette deep bowl has long been considered to be a type fossil for the beginning of LH III C (Mountjoy 1986, 151). However, this form may now possibly be documented in the horizon 17a4 of the Unterburg in Tiryns (FIG. 19. 6), but later intrusions in this context cannot be absolutely excluded.

The first evidence of medium-band deep bowls, i.e. deep bowls with a monochrome interior and only a medium rim band (0.5>2.4 cm) on the exterior, can be dated to horizon 17. Fragments of a medium band deep bowl (FIG. 20. 3) were found together with a medium band cup (FIG. 20. 4) in the debris of the earthquake destruction of Room 122, Building VI, in horizon 17a4. Another one was found in horizon 18 at the end of the Palatial period (FIG. 20. 1). Moreover, the Epichosis provided several restorable medium band deep bowls (Voigtländer 2003, 95–6 pl. 69, Si 142–5).

The earliest appearance of the completely monochrome deep bowl is still unclear. In Tiryns this feature is first securely documented early in horion 17 and possibly already in horizon 16 (Podzuweit 2007, 55, 60, 212). Podzuweit does not mention the quantity of monochrome deep bowls in horizons 17–18. They are also possibly documented in the Epichosis (Voigtländer 2003, 117 pl. 72; 134, Mo 10–14). However, in view of the state of preservation of these vessels an alternative identification as monochrome stemmed bowls FS 305 cannot be ruled out. At Mycenae the completely monochrome deep bowl FS 284 is documented throughout LH III B, a fact which can be interpreted as the continued popularity of monochrome vessels from LH III A2.

(*c*) *Shallow Bowls.* The first evidence of linear shallow-rounded bowl FS 295B with horizontal strap handles was found in the fill of the well in Kw 14 dating to horizon 17 (FIG. 15. 1). Of course, an earlier start of this feature cannot totally be excluded, as linear decorated shallow bowls of various different types appear in earlier horizons.

(*d*) *Deep cups.*

(1) Secure evidence: the first appearance of several types of deep cups with linear and monochrome decoration can be dated to horizon 17 in Tiryns. A medium band cup FS 215, i.e. monochrome interior and only a medium rim band on the exterior, was found

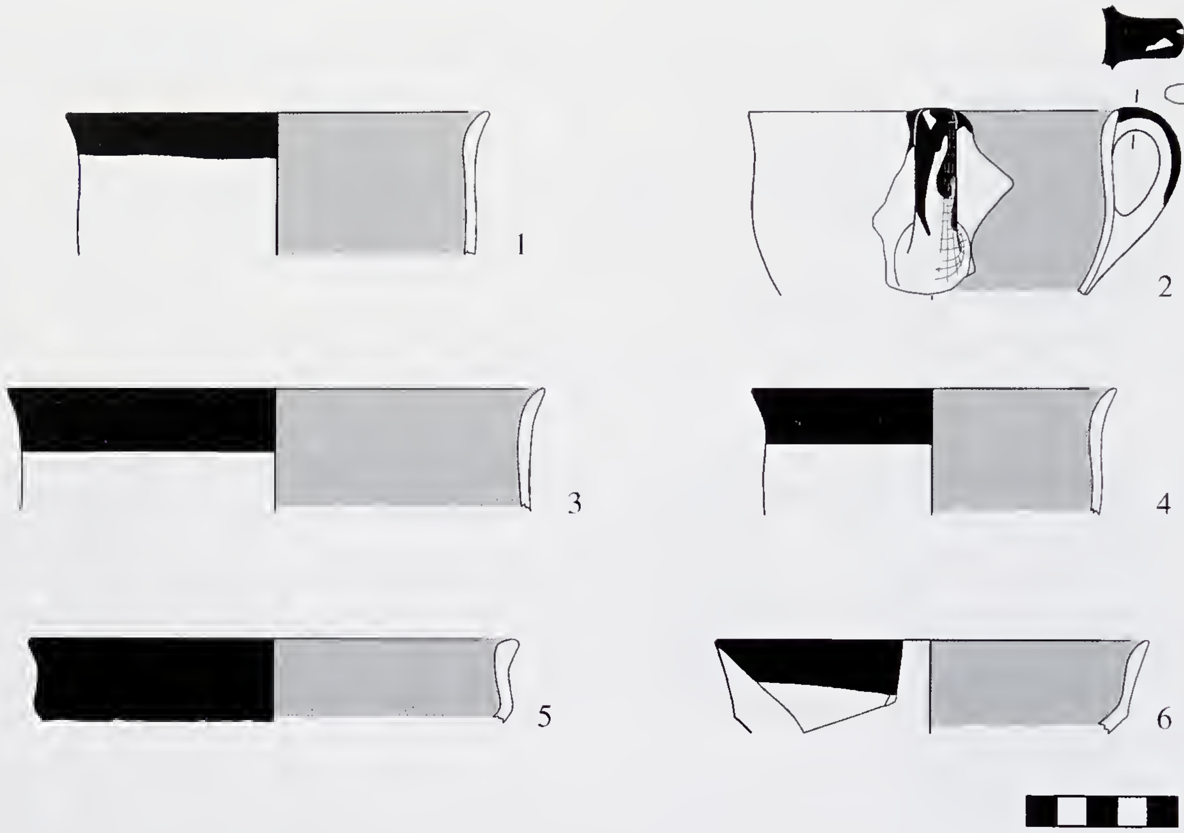

FIG. 20. Tiryns: Unterburg, LH III B2 Late examples from secure contexts.

sandwiched between the two floors of Room 10, Building I, and can safely be assigned to horizon 17a2 (FIG. 19. 8). Others were found in the slightly later destruction layer of the same room in horizon 17a4 (FIG. 20. 2) and in the debris of the earthquake destruction of Room 122, Building VI, in horizon 17a4 (FIG. 20. 4).

It is difficult to determine the first appearance of cups with dotted rim in Tiryns, as small rim sherds cannot be differentiated from those of the dipper. However, there is evidence for their presence in horizon 17–18. In addition a complete dotted rim cup was found in a probable burial in the Epichosis (Voigtländer 2003, 80 pl. 55, 117 Ta 6) with the feeding bottle G 43.

(2) Problematic evidence: linear deep cups with stemmed bowl banding may also appear in horizon 17. One quite well-preserved cup (FIG. 19. 9) was found in Abhub XIVb in the Zwinger. This layer is part of a fill that can be dated stratigraphically to SH III B Entwickelt at the latest. However, as the Zwinger area probably was an open courtyard and the strata of the Zwinger suffered from many intrusions in the Latest Palatial and the Post-Palatial period, one should be careful not to take this seemingly early evidence for this feature as a proof of its early appearance.

(*e*) *Carinated cup.* The beginning of the linear or monochrome carinated cup FS 240 in Tiryns has been the subject of controversy. The first appearance of this type fossil is dated by Podzuweit in the architectural phase SH III B Entwickelt (Podzuweit 2007, 117, 119, 201, 205, 212; *contra* Rutter 1977, 2, Deger-Jalkotzy 1982, 55–7, E.B. French 1985, 298, Mountjoy

1986, 134, Jung 2002, 152–3, who all see the start of this feature in LH III C Early). In this context, Podzuweit (2007, 78) also refers to a possible early instance from Tiryns-Stadt-West (Western Lower Town) in LH III A. Unfortunately, Podzuweit does not illustrate this very important find—not even in the context of his preliminary publication of the pottery from the Western Lower Town (Podzuweit and Salzmann 1977)—which leaves doubt about the correct identification of the vessel and the quality of its context. In order to resolve the discussion about the beginning of this form (at least in Tiryns), a re-examination was undertaken of the stratification and context of all carinated cups from the published works of Kilian and Podzuweit; the catalogue in Podzuweit's *Habilitationsschrift* (1992), which was not published with the rest of his work (Poduzweit 2007); and all the carinated cups identified during the excavation in the Lower Citadel and kept separately in the storeroom. Altogether 232 of the sherds that were certainly, probably, or possibly identified as carinated cups derive from stratified Mycenaean levels of the Lower Citadel. Small monochrome rim fragments were excluded, as they could also be classified as deep bowls, as not enough of the profile is preserved. In contrast to Podzuweit's results, and in spite of intense effort, no evidence for monochrome or linear painted carinated cups FS 240 in palatial contexts in Tiryns was found (see Stockhammer 2008 for a more detailed discussion). This type of cup is also missing in the rich ceramic material of the Epichosis (Verdelis, French, and French 1965; Voigtländer 2003, esp. 99–100). The relevant rim fragments from Midea (Demakopoulou and Divari-Valakou 1996, 19 fig. 18) are now classified by Demakopoulou (pers. comm.) as monochrome carinated kylikes, which are clearly documented in this horizon by a rim fragment with part of the handle.

(*f*) *Carinated kylikes.* Podzuweit has already noted the appearance of linear or monochrome carinated kylikes in the architectural horizon SH III B Entwickelt (Podzuweit 2007, 110, 117, 196, 205, 211–12, 222). A monochrome carinated kylix was stratified under the floor of Room 15, Building VIII, and can be attributed to horizon 17a0 (FIG. 20. 5). A rim sherd of a carinated kylix with monochrome interior and a medium band on the exterior was found in the debris of the earthquake destruction of horizon 17a4 in Room 122, Building VI (FIG. 20. 6).

Relation to Transitional LH III B2–LH III C Early (By E.B. French and Ph. Stockhammer)

As defined by Mountjoy (1997) the 'Transitional' pottery phase lies between LH III B2 and LH III C Early and is characterized by an admixture of new features amid material otherwise similar to that of the preceding phase. She stated clearly (1997, 110) that in her view this phase 'postdates the pottery in the destruction levels in the citadels at Mycenae and Tiryns at the end of LH IIIB 2'. She did, however, consider pottery of this phase to be present in the destruction level at Midea.

In the summer of 1997 E.B. French finalized her analysis of the stratigraphy of the LH III B2 and LH III C levels of the Citadel House Area and circulated the result to those interested. (This was presented at the Mycenaean Seminar in London on 17 March 1999: E.B. French 1999). With this evidence in mind and having seen a prepublication draft of Mountjoy's Pylos article, in March 1998 she inserted into the final text of WBM 10 (p. 3) a statement calling

attention to the presence in the destruction levels at Mycenae of 'some features immediately antecedent to LH III C' and 'some sherds individually of LH III C type'. The presence of such material had been known since at least 1989 as it is noted in the draft of WBM 9 (see above) on the South House Annex. She misunderstood Mountjoy to accept this evidence as showing that at Mycenae, like Midea, her Transitional phase was already present in the Phase VIII destruction level. The definition of LH III B2 Late presented here attempts to correct this misunderstanding.

It may be noted that any identifications of LH III C Early material from the Citadel House Area at Mycenae made before 1997 were stylistic and not stratigraphic. Thus, one Deep Bowl of the type common in LH III C Early was chosen by Mountjoy for her book from our photographs of registered pottery arranged partly by stratigraphy and partly by style (Mountjoy 1986, 151 fig. 190. 2); after subsequent study, however, it proved to have been found on a Phase VIII destruction floor and belongs, in fact, to LH III B2 Late. It is a good example of the problems addressed here.

Mountjoy (1997) gave many examples from a wide range of sites of the four types of Deep Bowl which she identifies, and states (1997, 112) that the features she lists as Deep Bowl types 2–4 are 'the criteria of this phase'. These are not obviously present at either Mycenae or Tiryns, either in the destruction levels or in those immediately subsequent to the destruction (see below). Type 1 is present at both sites but of the others only 54–289 (FIG. 2. 2) from Mycenae and a LH III B2 Early Deep Bowl A/B from Tiryns (FIG. 18. 3 = Schönfeld 1988, 175 fig. 5. 9) need be mentioned, which have a somewhat angular profile (type 3); but this is not the only divergent feature for either example. Moreover at Mycenae, there are no examples of Wavy Band on Deep Bowls either before or after the destruction. In Tiryns there is no clear evidence for Wavy Band on the Deep Bowl in LH III B from the Unterburg (*contra* Podzuweit 2007, 38: SH III B Ende), as the relevant vessel (Podzuweit 2007, pl. 13. 2: LXI 40/18 XVIIa R 120) came from a post-palatial intrusion down into the stratum of horizon 17a4 inside Room 120 not recognized by Kilian or Podzuweit, but only recently in the context of the revaluation of the Unterburg stratigraphy. However, several bowls with Wavy Band were found in the Epichosis (Voigtländer 2003, 73–5 pls. 49–50, 109–110 SW 1– 27); of the five (SW 21–5) which might be classified as Deep Bowls on the basis of the lip profile, SW 23 and 25 come from the deposit itself. Throughout all LH III C this motif is common on Deep Bowls in Tiryns (cf. Podzuweit 2007, pls. 12–14). The evidence of the Wavy Band on Deep Bowls clearly shows differing microregional preferences within the Argolid.

Several of the additional shapes listed by Mountjoy are known from the LH III C Early 1 floors at Mycenae and from horizon 19 from the Unterburg in Tiryns (e.g. Podzuweit 2007, pl. 19, 8: LXI 41/05.15 Xa G 32, i.e. horizon 19ba) while others are known earlier.

The Übergangshorizont (transition horizon) of the Unterburg was first mentioned by Kilian in his second preliminary report 1979 (Kilian 1979, 389, 404; Kilian 1980, 184 fig. 7; 185, 193). As an architectural phase he places this Übergangshorizont (or rather Ruinenbewohnung by squatters) directly after the destruction of the Unterburg at the end of LH III B2 and before the proper LH III C construction phase (Kilian 1979, 404). In his view, the pottery of this phase shows strong relations to the high quality wares of LH III B as well as to the features of LH III C (Kilian 1979, 404). When in 1979 Podzuweit first defined the pottery features of this Übergangshorizont, he characterized it as a typical late LH III B inventory in which type fossils of LH III C Early already appear, namely the monochrome

carinated cup FS 240, the linear carinated bowl FS 295, the conical bowl FS 242 and the linear kylix FS 274 (Podzuweit 1979*a*, 412; Podzuweit 1979*b*, 217). In contrast to Kilian, however, Podzuweit is not consistent in his placing of this Übergangshorizont. In his pottery reports from 1979 and 1981 he places it, as does Kilian, at the very beginning of the Post-Palatial period (e.g. Podzuweit 1979*a*, 412; 1981, 204); in his pottery report from 1982 he uses the term 'Übergangshorizont' synonymously with 'spätestes SH III B' (latest LH III B) and locates this phase explicitly before the destruction of the Unterburg (Podzuweit 1982, 68. 70). In his 1981 report only the monochrome carinated cup FS 240 remains as a type fossil of those mentioned in 1979 (Podzuweit 1981, 204–205). At the same time, he presents a seemingly closed context with pottery typical for the Übergangshorizont, Room 10a (Podzuweit 1981, 201 fig. 54; 204–5). However, the monochrome carinated cup FS 240, one of the most innovative features said to appear in this horizon, is not illustrated. In 1984 Podzuweit (1984, 12–13) also redated the first appearance of the monochrome carinated cup FS 240 to LH III B, depriving his former Übergangshorizont of the last remaining diagnostic feature. Therefore, it causes no surprise that the Übergangshorizont is no longer mentioned in his *Habilitationsschrift* finished in 1992 and published in 2007. While a critical reading of the pottery reports can show the deconstruction of this horizon by Podzuweit himself, the published sherds from Room 10a have long remained a complex of uncertain chronological position, as the stratigraphy of the Unterburg has not yet been finally published. A glance at the contexts of the illustrated sherds reveals that the pieces derive from two different Abhübe, the Abhub IX and IXb (Podzuweit 1981, 218). Already in the late 1980s it must have become clear that while the Abhübe IXc–a represent the earthquake destruction of Rooms 10 and 8, Building I, at the end of the Palatial period and can be attributed to horizon 18, Abhub IX has to be positioned after the earthquake destruction in horizon 19a (Podzuweit 2007, 324; Damm-Meinhardt, pers. comm.). Moreover, a comparison between the contexts given by Podzuweit for the illustrated pieces (Podzuweit 1981, 218) and the plan published by Kilian (1981, fig. 27) reveals that only four of these (Podzuweit 1981, 201 fig. 54. 3, 9, 13, 14) come from Room 10a and that the find spot of the other sherds except for two is located east of Room 10a (Podzuweit 1981, 201 fig. 54. 1, 7, 10–12; pieces 2 and 8 are included in error), in other words, in or above Room 8. Podzuweit may well be right that there was some form of successor to Room 8 in horizon 19a but it cannot be proven stratigraphically. The pottery illustrated in Podzuweit 1981, fig. 54 belongs to slightly different horizons. None of the sherds was in a primary position. It could have been included in the mudbricks of Rooms 8 and 10, or in filling or levelling processes after the destruction, etc. Consequently it has to be excluded from any chronological considerations in trying to define LH III B2 or LH III C Early in Tiryns.

Thus neither at Mycenae nor at Tiryns is it possible at present to isolate a distinct 'Transitional' pottery phase as defined by Mountjoy. Rather what seems to emerge is an increasing diversity among the few pottery workshops of the Argolid rather than the previously striking conformity (for a revaluation of palatial and post-palatial pottery production cf. Stockhammer 2008) over a period of historical disruption. This would not be unlikely if the earthquake destructions in the course of LH III B2 in Mycenae and Tiryns resulted in a lessening of bureaucratic dominance and restriction, maybe also because of the excessive demands with which the palaces were confronted in the last phases of the Palatial period.

Levels Overlying the Destruction (By E.B. French and Ph. Stockhammer)

At Mycenae, although the stratigraphy is clear, there is a difficulty in defining the pottery used in the phase immediately after the destruction, because so much use was made of the actual destruction debris in the subsequent rebuilding. Such walls as remained standing, including the West Citadel Wall itself, were used to support substantial terraces filled with the debris containing a mixture of sherd material dating from much earlier periods through to that of the destruction level. Although material exhibiting new features may well occur in these terraces, it cannot be isolated with any certainty as it forms a stylistic continuum with what went before.

It seems quite possible that the reconstruction period and the occupation period of these new complexes may have lasted for some time. They were well built and substantial. However, they were finally destroyed in what appears to have been another earthquake, which in one case caused the collapse of one of the reused walls over a floor covered in pottery. Throughout the Citadel House Area some 90 restorable pots were recovered from floors of this phase—referred to as LH III C Early 1 (E.B. French 2007, 528). Over half of these were decorated. The shapes represented have been listed and illustrated in E.B. French 2007, fig. 1, 4–7, and fully catalogued in WBM 16/17. They are not, however, as yet paralleled at Tiryns.

In Tiryns it is equally difficult to characterize LH III C Early 1. This phase comprises the horizons 19a0-a1 on the Unterburg and the older subhorizon of horizon 19 A in the North-Western Lower Town in which the monochrome carinated cups FS 240—the most prominent type fossil of LH III C Early 2—are still missing (Stockhammer 2006, 146; 2008). However, the system of storing and archiving used during Kilian's excavations prevents us from reconstructing floor deposits of LH III C Early 1 on the Unterburg and in the North-Western Lower Town. In the North-Eastern Lower Town the first settlement phase started in LH III C Early 1 and continued into III C Early 2, making it very difficult to determine which features might have appeared in III C Early 1 and which in III C Early 2 (Maran and Papadimitriou 2006, 104–5; Stockhammer 2006, 145–7, 156; 2008).

The only shape that seems, at present, to serve as a universal 'type fossil' for the LH III C Early 1 phase is the shallow angular bowl FS 295A, with a very soft carination (Mountjoy 1986, 153 fig. 197. 1); this also has a spiral on the inside of the base. This type derives from the rounded form FS 295B of LH III B2 Late and develops itself into the form FS 295C in LH III C Middle, a form which becomes overwhelmingly popular. The various types of this shape, its development, and its relation to FS 296 are shown in fig. 25.

Summary (figs. 21–4) (By E.B. French and Ph. Stockhammer)

At Tiryns a primary result of this study is the realization that LH III B2 Early starts with the architectural horizon SH III B Mitte (LH III B Middle) and not with SH III B Entwickelt (LH III B Developed), as once claimed by Kilian (1988*b*, 118) and more recently by Vitale (2006, 197).

The introduction of the term LH III B2 Late for the phase immediately preceding the destructions has considerable consequences for existing and competing chronological systems: Podzuweit's phases SH III B Entwickelt and SH III B Ende are both subsumed into it.

FIG. 21. LH III B2 Early: Diagnostic Features, examples from Mycenae (1, 3, 5) and Tiryns (2, 4, 6, 7).

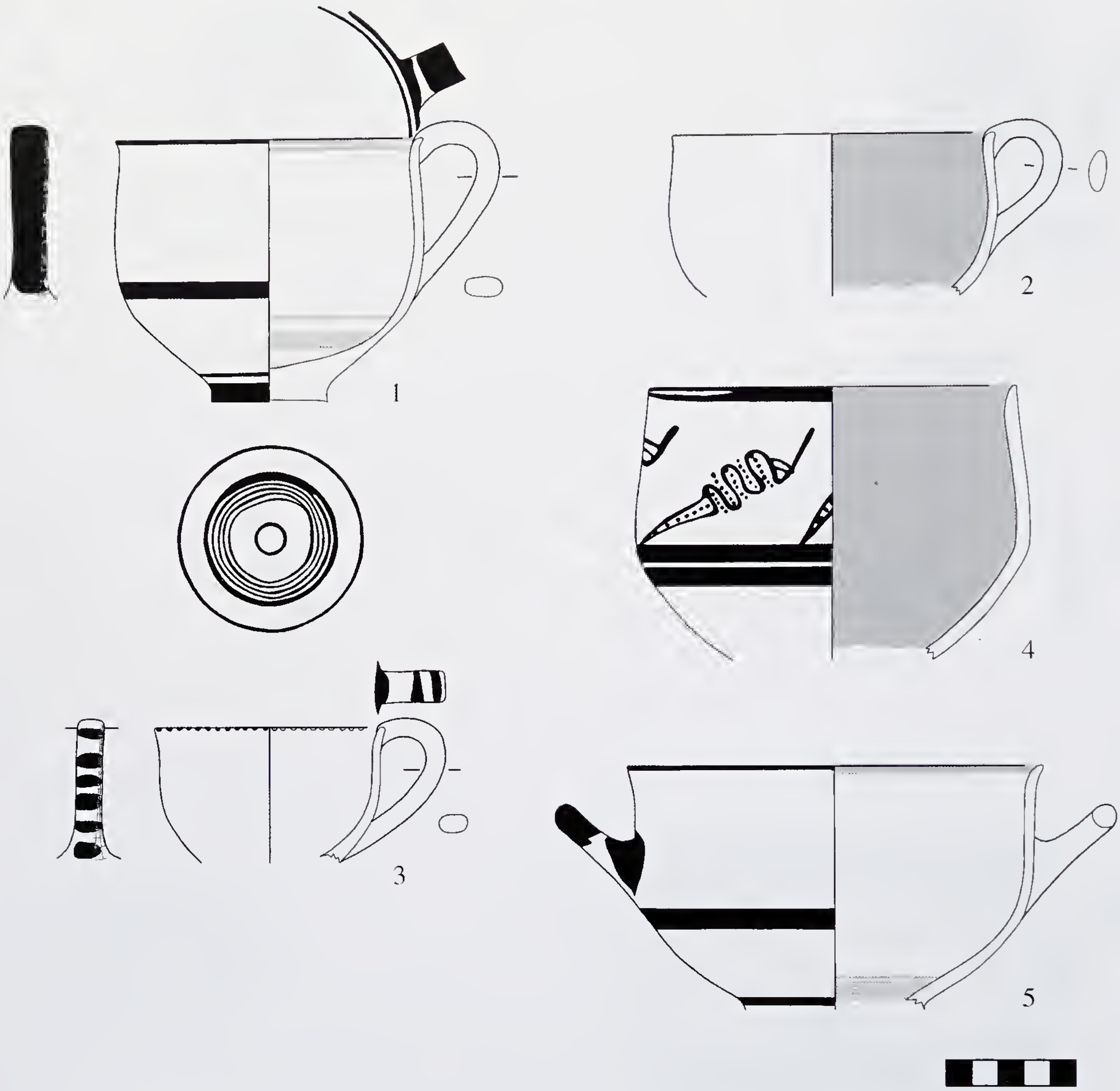

FIG. 22. LH III B2 Early: Problematic Features, examples from Mycenae (1, 3) and Tiryns (2, 4, 5).

The further subdivision of LH III B2 Late pottery between the two architectural horizons SH III B Entwickelt and SH III B Ende is not possible for Tiryns at the moment, as the closed floor contexts of the Kilian excavations were not kept together. However, the latest excavations in the Northern Lower Citadel in Tiryns (2000–3) have produced new and rich contexts (Maran forthcoming). At other sites, however, it cannot be demonstrated, perhaps because the relevant levels are not present or have not been identified. The horizons 17a0–18 in the Lower Citadel at Tiryns are assigned to the phase LH III B2 Late.

Therefore, future research in Tiryns, especially the complete evaluation of the floor contexts from the Northern Lower Citadel, might enable us to differentiate further the

FIG. 23. LH III B2 Late: Diagnostic Features, examples from Mycenae (1, 3, 4, 6) and Tiryns (2, 5, 7).

pottery development within the phase LH III B2 Late. It might be possible to see whether Tiryns and Mycenae were destroyed at the same time.

It is obvious that the Epichosis deposit contains a small proportion of material of this phase as well as a very considerable quantity of LH III B1 and B2 Early. It seems to us likely, but not at present provable, that this is a cumulative deposit covering the whole Palatial period. A few

FIG. 24. LH III B2 Late: Diagnostic Features, examples from Mycenae (1, 6) and Tiryns (2–5, 7, 8).

rogue intrusions are clear (Voigtländer 2003, 85, 94 pl. 67, Si 127, 129; Jung 2006, 194) but whether there is any serious component of the first post-palatial phase is still uncertain.

At Mycenae the Citadel House Area with the South House has given some clear but scanty evidence. It may be hoped that, as the other areas of the Citadel at Mycenae excavated by the Archaeological Society are studied, more evidence may come to light. Already Iakovides has noted the presence of our variant types of Deep Bowl in the North-West Quarter (Iakovides 2006, 176).

There remains the other major Citadel of the main Argive plain: Midea. Here also there is evidence of a major destruction. Mountjoy has assigned this to her LH III B–LH III C Transition period. Demakopoulou (2003) prefers to call the period LH III B2 although she recognizes the presence of the material on which Mountjoy's assessment is made. Again, it seems likely, but not provable, that this site was destroyed in LH III B2 Late like Mycenae and Tiryns and that the material is largely comparable with ours. Judgement on this must await final study and analysis by the excavators of the very large bulk of material from the various parts of the site.

With this definition of a LH III B2 Late horizon we are trying to unify the latest phase of the Palatial period immediately before the destruction of the Mycenaean centres in the Argolid in both terminology and content. The plethora of possible diagnostic features should facilitate identification. However, one has to bear in mind that all the features identified also continue and become even more frequent in the Post-Palatial period. Therefore, it is essential to demonstrate the absence of type fossils of LH III C Early before attributing a find complex to LH III B2 Late at other sites.

In the destruction contexts marking LH III B2 Late so far isolated and which we have described in detail above, it is possible to note something of a disintegration of the tight standardization in pottery decoration of the previous phase. The salient features may be summarized as follows:

1. The variation of standard types of rim and body decoration on the 'type fossils' of Deep Bowl which have been identifying features in earlier phases.
2. After first appearing in LH III B2 Early, growing frequency in the use of a variety of 'linear' types of decoration (including the dotted rim) on Deep Cups, which have previously been unpainted.
3. Similar variation in the decoration of carinated and, very rarely, conical kylikes (and here dotted rims only, not linear decoration) which in the previous phase have been unpainted.
4. The start of the series of linear bowls of which the gradual development of shape forms a very important feature on the mainland, on Cyprus and in the Levant (Ussishkin 2004, 1447). These are initially linear versions of unpainted shapes. The first to appear is FS 295B; the others characterize various phases of LH III C. The development of shallow linear bowls in LH III B and III C at Mycenae and Tiryns is illustrated in FIG. 25.
5. The first appearance of slightly hollowed lips on large closed vessels with only linear decoration.

We can see here a wide range of vessel types used apparently for a similar purpose. Moreover a large number of cups and deep bowls with only linear decoration appears suddenly.

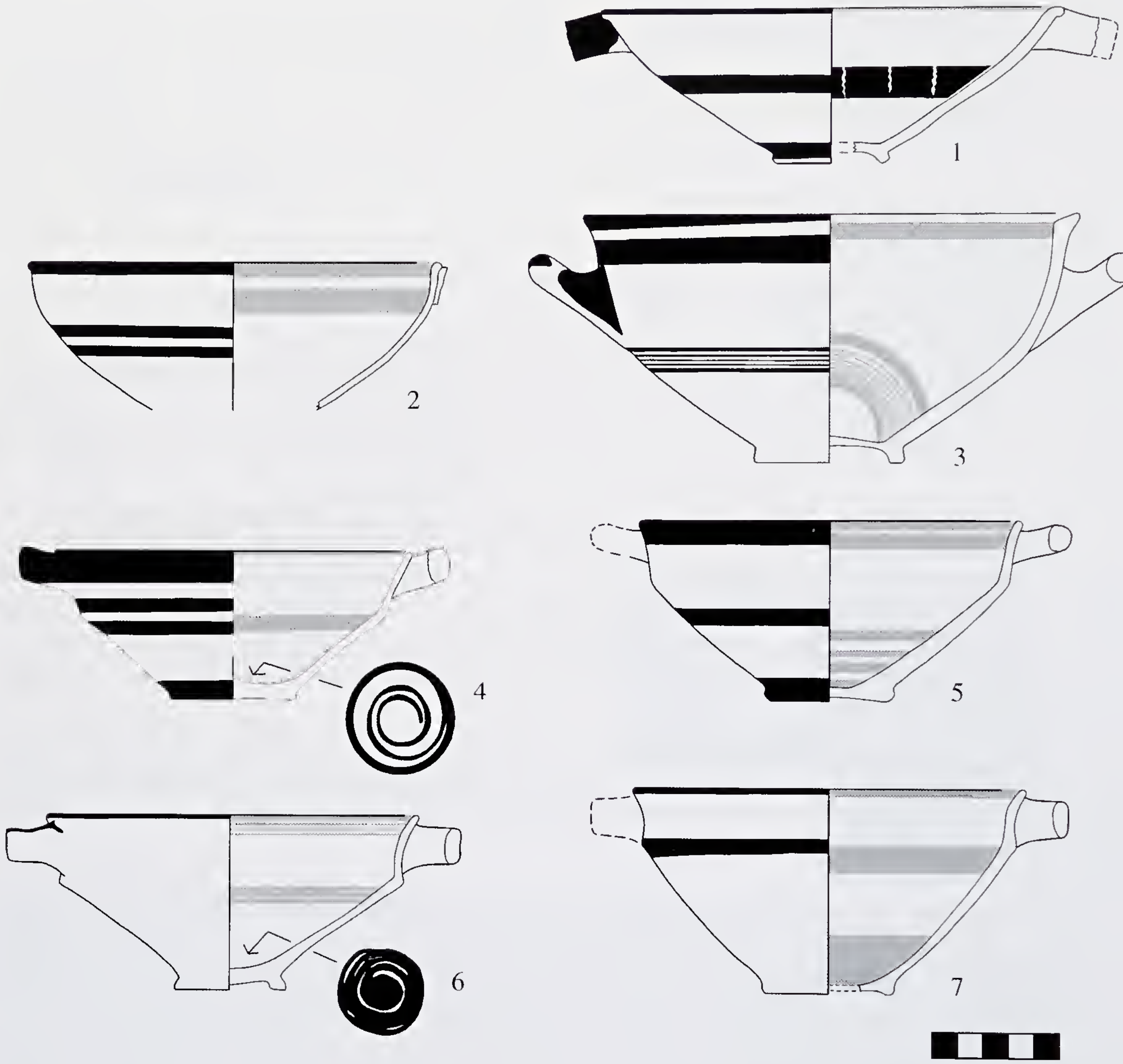

FIG. 25. Bowl Types FS 296 (1), FS 295B (2, 3), FS 295A (4, 5), FS 295C (6, 7) from Mycenae (2, 4, 6) and Tiryns (1, 3, 5, 7).

Nevertheless, they show some standardization, for instance with regard to the combination of monochrome interior with some distinct types of rim banding. Thus in LH III B2 Late a change in the usage of linear decoration seems to have taken place as well as wide experimentation in the decoration of each shape.

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Sources of Figures

Fig.	Name	Context		Publication
	Mycenae (All illustrations are copyright Mycenae Archive)			
1	plan of the Mycenae Citadel House Area			
2. 1	Deep Bowl FS 284. type A	SHs Ann, Room 1	Ex No 54–288; BE No 15907; G'54/052; Phase 0831	WBM 9
2. 2	Deep Bowl FS 284. type C	SHs Ann, Room 1	Ex No 54–289; BE No 15914; G'54/052; Phase 0831	Wace 1955, pl. 20 c; WBM 9
2. 3	Deep Bowl FS 284. type A	SHs Ann, Room 1	Ex No 54–525; BE No 15909; G'54/108; Phase 0831	WBM 9
2. 4	Unpainted Kylix FS 274	SHs Ann, Room 1	Ex No 54–528; BE No 15911; G'54/108; Phase 0831	WBM 9
2. 5	Cooking Pot, Jug	SHs Ann, Room 1	Ex No 54–527; BE No 15913; G'54/108; Phase 0831	WBM 9
3. 1	Vat	SHs Ann, Room 1	Ex No 54–526; BE No 9507; G'54/104; Phase 0832	Wace 1955, pl. 20 d; WBM 9
3. 2	Canaanite Jar	SHs Ann, Room 1	Ex No 54–601; BE No 16750; G'54/039; Phase 0832	Wace 1955, pl. 20 b; WBM 9
3. 3	Transport Stirrup-Jar FS 164. false spout	SHs Ann, Room 1	Ex No 54–573; BE No 15906; G'54/108; Phase 0831	WBM 9
3. 3	Transport Stirrup-Jar FS 164. spout	SHs Ann, Room 1	Ex No 54–575; BE No 15915; G'54/052; Phase 0831	WBM 9
4. 1	Deep Bowl FS 284. type C	SHs Ann, Room 4	Ex No 60–322; BE No 17003; G6'60/35; Phase 0835	MT III, fig. 90; WBM 9
4. 2	Deep Bowl FS 284. type C	SHs Ann, Room 5	Ex No 60–325; BE No 17000; G6'60/46. 47; Phase 0832	WBM 9
4. 3	Deep Bowl FS 284. type A	SHs Ann, Room 5	Ex No 60–326; BE No 17002; G6'60/46. 47; Phase 0832	WBM 9
4. 4	Jar FS 112. unpainted	SHs Ann, Room 5	Ex No 60–328; BE No 17004; G6'60/48; Phase 0832	WBM 9
4. 5	Cup FS 215. dotted rim	SHs Ann, Room 6	Ex No 62–416; BE No 15990; G10'62/77; Phase 0831	WBM 9
4. 6	Miniature bowl	SHs Ann, Room 6	Ex No 62–403; BE No 16004; G10'62/22; Phase 0831	WBM 9
4. 7	Bird Askos	SHs Ann, Room 6	Ex No 62–415; BE No 15989; G10'62/74; Phase 0834	WBM 9
4. 8	Small Stirrup-Jar	SHs Ann, Room 6	Ex No 62–539; BE No 16000; G11'62/93; Phase 0812/833	WBM 9
5. 1	Deep Bowl FS 284. type A	SHs Ann, Room 7	Ex No 62–0406; BE No 15998; G10'62/40; Phase 0831	WBM 9
5. 2	Cup FS 215. dotted rim	SHs Ann, Room 7	Ex No 62–413; BE No 15997; G10'62/67; Phase 0831	WBM 9
5. 3	Kylix FS 274. dotted rim	SHs Ann, Room 7	Ex No 62–0412; BE No 15999; G10'62/62. 63; Phase 0832	WBM 9
5. 4	Pot Stand	SHs Ann, Room 7	Ex No 62–414; BE No 15986; G10'62/67; Phase 0831	WBM 9
5. 5	Jug	SHs Ann, Room 7B	Ex No 62–417; BE No 15993; G10'62/80; Phase 0831	WBM 9

5. 6	Deep Bowl FS 284. type B	South House, Central Rm	Ex No 20–109; BE No 5399; Area k, Pillar Room; Phase 0830	Wace 1921–3, pl. V c; WBM 9
6. 1	Small Collar-Necked Jar FS 64	West House	Ex No 43; BE No 2771; Phase 0731	French 1967, pl. 38 c
6. 2	Rosette Deep Bowl	Causeway Deposit	BE No 23488–23492; G1'60; Phase 0828	Wardle 1973, 315 fig. 10. 56
6. 3	Deep Bowl FS 284. type B	Causeway Deposit	BE No 23488–23494; G1'60; Phase 0828	Wardle 1973, 316 fig. 11. 64
6. 4	Deep Bowl FS 284. type B	Causeway Deposit	Ex No 60–310; BE No 15975; G1'60; Phase 0828	Wardle 1973, 316 fig. 11, 66
7. 1	Deep Bowl FS 284. type A	Megaron, Room II	Ex No 62–555; BE No 16133; G23'62/158; Phase ?0732	WBM 12
7. 2	Small Deep Bowl FS 284. dotted rim	Megaron, Room II	Ex No 62–554; BE No 16134; G23'62/158; Phase ?0732	WBM 12
7. 3	Cup FS 215. linear	Megaron, Room II	Ex No 62–460; BE No 16107; G23'62/158; Phase ?0732	WBM 12
7. 4	Cup FS 215. dotted rim	Megaron, Room II	Ex No 62–543; BE No 16109; G23'62/158; Phase ?0732	WBM 12
8. 1	Deep Bowl FS 284. type A, flaring lip	Passage 34	Ex No 69–411; BE No 16505; GMBW'69/27&; Phase 0834/805	WBM 13
8. 2	Small Deep Bowl FS 284. dotted rim	Passage 34	Ex No 69–404; BE No 16495; GMBW'69/34; Phase 0834/805	WBM 13
8. 3	Kylix FS 267. linear/monochrome	Passage 34	Ex No 68–445; BE No 16410; G23'68/18; Phase 0728/805	WBM 13
8. 4	Amphora, hollow lip	Passage 34	Ex No 69–407a; BE No 21771; GMBW'69/27. 40; Phase 0805	WBM 13
8. 5	Cup FS 216. linear	Small Court 35	Ex No 68–458; BE No 16480; G23'68/136&; Phase 0831	WBM 13
8. 6	Cup FS 215. dotted rim	Room xxiv	Ex No 68–541; BE No 16414; G23'68/57&; Phase 0827/832	WBM 13

Tiryns (All drawings are copyright Deutsches Archäologisches Institut)

9	plan of the Tiryns Unterburg			Damm-Meinhardt forthcoming
10. 1	Deep Bowl FS 284. type A	Building XIV, Room 223	LXII 36/13 VI; Horizon 17a1	Photo M. Riedl, Tiryns
10. 2	Globular Stirrup-Jar FS 173	Building XIV, Room 223	LXII 36/01 Ofl. VII; Horizon 17a1	Photo M. Riedl, Tiryns
10. 3	Vessels *in situ* on the floor of Room 223	Building XIV, Room 223	Horizon 17a1	Photo 1982, film 14, no. 62
11. 1	Deep Cup FS 215. linear	Building XIV, Room 223	LXII 35/93 VII + 36/3 VII; Horizon 17a1	Drawing Tiryns Archive no. 11/71 and 11/184
11. 2	Deep Bowl FS 284. type A	Building XIV, Room 223	LXII 36/32 VIb; LXII 36/04 VII; Horizon 17a1	Drawing Tiryns Archive no. 11/130
11. 3	Narrow-Necked Jug FS 120	Building XIV, Room 223	LXII 35/91 Ofl. VII; LXII 36/1 Ofl. VII a 12.56; Horizon 17a1	Drawing Tiryns Archive (without number)
11. 4	Mug FS 226	Building XIV, Room 223	LXII 36/3.4 Ofl. VII; Horizon 17a1	Kilian 1988*a*, 121 fig. 17

12. 1	Deep Bowl FS 284. type B	Building XIV, Room 225.226	LXI 35/78 Ofl. XIVa; Horizon 17a4–18	Photo 1983, film 19, no. 9
12. 2	Small Stirrup-Jar FS 173	Building XIV, Room 225.226	LXI 35/98 XIII; Horizon 17a4–18	Drawing Tiryns Archive no. 10/59
12. 3	Carinated Kylix FS 267. unpainted	Building XIV, Room 225.226	LXI 35/87 XIII; Horizon 17a4–18	Drawing Tiryns Archive no. 10/44
13. 1	Deep Bowl FS 284. type A	Casemate Kw 14. Well	LXI 35/63 XIVl.m; Horizon 17a1–17a5	Kilian 1988*a*, 119 fig. 14. 2; Drawing Tiryns Archive no. 9/1093
13. 2	Deep Bowl FS 284. type A	Casemate Kw 14. Well	LXI 35/63 XIVg; Horizon 17a1–17a5	Kilian 1988*a*, 119 fig. 14. 6; Drawing Tiryns Archive no. 9/1210
13. 3	Deep Bowl FS 284. type A	Casemate Kw 14. Well	LXI 35/63 XIVo.p; Horizon 17a1–17a5	Kilian 1988*a*, 119 fig. 14. 4; Drawing Tiryns Archive no. 9/1115
13. 4	Deep Bowl FS 284. type A	Casemate Kw 14. Well	LXI 35/63 XIVp; Horizon 17a1–17a5	Drawing Tiryns Archive no. 11/148
13. 5	Deep Bowl FS 284. type A	Casemate Kw 14. Well	LXI 35/63 XIVk.m; Horizon 17a1–17a5	Kilian 1988*a*, 119 fig. 14. 1; Drawing Tiryns Archive no. 9/1137
13. 6	Deep Bowl FS 284. type A	Casemate Kw 14. Well	LXI 35/63 XIVc; Horizon 17a1–17a5	Drawing Tiryns Archive (without number)
13. 7	Deep Bowl FS 284. type A	Casemate Kw 14. Well	LXI 35/63 XIVc.m.n.o; Horizon 17a1–17a5	Kilian 1988*a*, 119 fig. 14. 3; Drawing Tiryns Archive no. 9/1155
13. 8	Deep Bowl FS 284. type A	Casemate Kw 14. Well	LXI 35/63 XIVo.p.t; Horizon 17a1–17a5	Kilian 1988*a*, 119 fig. 14. 5; Drawing Tiryns Archive no. 9/1168
14. 1	Deep Bowl FS 284. type B	Casemate Kw 14. Well	LXI 35/63 XIVe.g; Horizon 17a1–17a5	Kilian 1988*a*, 118 fig. 13. 3; Drawing Tiryns Archive no. 9/1182
14. 2	Deep Bowl FS 284. type B	Casemate Kw 14. Well	LXI 35/63 XIVg; Horizon 17a1–17a5	Kilian 1988*a*, 118 fig. 13. 4; Drawing Tiryns Archive no. 9/1372
14. 3	Deep Bowl FS 284. type B	Casemate Kw 14. Well	LXI 35/63 XIVg; Horizon 17a1–17a5	Kilian 1988*a*, 118 fig. 13. 1
14. 4	Deep Bowl FS 284. dotted rim	Casemate Kw 14. Well	LXI 35/63 XIVg; Horizon 17a1–17a5	Drawing Tiryns Archive no. 9/1060
14. 5	Deep Bowl FS 284. type A/B	Casemate Kw 14. Well	LXI 35/63 XIVg; Horizon 17a1–17a5	Kilian 1988*a*, 118 fig. 13. 2; Drawing Tiryns Archive no. 9/1124

14. 6	Stemmed Bowl FS 305	Casemate Kw 14. Well	LXI 35/63 XIVn.m.p.q; Horizon 17a1–17a5	Kilian 1988*a*, 119 fig. 14. 7; Drawing Tiryns Archive no. 9/1001
15. 1	Shallow rounded Bowl FS 295B	Casemate Kw 14. Well	LXI 35/63 XIVm; Horizon 17a1–17a5	Kilian 1988*a*, 119 fig. 14. 8; Drawing Tiryns Archive no. 9/1086
15. 2	Basin FS 294	Casemate Kw 14. Well	LXI 35/63 XIVg.h; Horizon 17a1–17a5	Drawing Tiryns Archive no. 9/810
15. 3	Basin FS 294	Casemate Kw 14. Well	LXI 35/63 XIVh; Horizon 17a1–17a5	Kilian 1988*a*, 116 fig. 12. 4; Drawing Tiryns Archive no. 9/1226
16. 1	Conical Kylix FS 274. unpainted	Casemate Kw 14. Well	LXI 35/63 XI; LXI 35/63 XIVg; Horizon 17a1–17a5	Drawing Tiryns Archive no. 10/29
16. 2	Krater FS 281. pictorial	Casemate Kw 14. Well	LXI 35/65 XIVg-h; LXI 37/78 IV; LXI 41/43 XI grau ; Horizon 17a1–17a5	Kilian 1988*a*, 116 fig. 12. 3; Avila, Grossmann, and Schäfer 1980, 25 pl. 7. 101; Güntner 2000, 64–5 pl. 29. 1 *a–b*; Drawing Tiryns Archive no. 9/1323
17. 1	Jug FS 110	Casemate Kw 14. Well	LXI 35/63 XIVn; Horizon 17a1–17a5	Drawing Tiryns Archive no. 9/1205
17. 2	Jug FS 110	Casemate Kw 14. Well	LXI 35/63 XIVn; Horizon 17a1–17a5	Kilian 1988*a*, 118 fig. 13. 5; Drawing Tiryns Archive no. 9/1195
17. 3	Feeding Bottle FS 159	Casemate Kw 14. Well	LXI 35/63 XIVk.p.q.v.; Horizon 17a1–17a5	Kilian 1988*a*, 116 fig. 12. 1; Drawing Tiryns Archive no. 9/1097
17. 4	Small Stirrup-Jar FS 173	Casemate Kw 14. Well	LXI 35/63 XIVn; Horizon 17a1–17a5	Kilian 1988*a*, 116 fig. 12. 2
18. 1	Small Collar Necked Jar FS 64	Courtyard	LXII 43/84 XVIII; Horizon 16a2	Schönfeld 1988, 195 fig. 10. 4
18. 2	Rosette Deep Bowl FS 284	Courtyard	LXI 42/68 XV; Horizon 16a7	Schönfeld 1988, 203 fig. 12. 2
18. 3	Deep Bowl FS 284. type A/B	Courtyard	LXI 42/80 XVIa; Horizon 15a2–16a4	Schönfeld 1988, 175 fig. 5. 9
18. 4	Deep Bowl FS 284. linear	Room 214	LXII 43/11 XVIb; Horizon 16a3	Schönfeld 1988, 177 fig. 6. 13; Drawing Tiryns Archive no. 7/1432
18. 5	Shallow Bowl FS 296. added white	Room 215	LXII 43/42 XVIc; LXII 43/43 XVI; Horizon 16a1	Schönfeld 1988, 193 fig. 9. 13

18. 6	Deep Cup FS 215	Room 215	LXII 43/42 XVIb gelb; Horizon 16a3	Schönfeld 1988, 193 fig. 9. 7
19. 1	Amphora/Jug/ Hydria, hollow lip	Building VIII, Room 15	LXI 39/71 XV; Horizon 17a2–17a4	Podzuweit 2007, fig. 103. 2
19. 2	Deep Bowl FS 284	Building I, Room 10	LX 38/90 IXf; LX 38/71 lXe; LX 38/89 IXf; Horizon 17a2 and 17a4	Podzuweit 2007, fig. 7. 3; Drawing Tiryns Archive no. 4/9550
19. 3	Deep Bowl FS 284. type SB	Zwinger	LXI 41/64 XIVd; Horizon 17a3	Podzuweit 2007, fig. 3. 5
19. 4	Deep Bowl FS 284. type SB	Building VI, Room 123	LXI 42/19 Xa G 41 a 1465; LXI 42/10 Xa; Horizon 18	Drawing Tiryns Archive no. 4/16381
19. 5	Deep Bowl FS 284. type SB	Building I, Room 10	LXI 38/71 IXf; Horizon 17a2	Drawing Tiryns Archive no. 4/9464
19. 6	Rosette Deep Bowl FS 284. linear	Building VII, Room 120	LXI 40/47.57 Ofl. XVIII; Horizon 17a4	Podzuweit 2007, fig. 16. 10
19. 7	Deep Bowl FS 284. linear	Building VI, Room 121	LXI 41/78 XI; Horizon 17a4	Podzuweit 2007, fig. 19. 6
19. 8	Deep Cup FS 215	Building I, Room 10	LXI 38/71 IXf; Horizon 17a2	Podzuweit 2007, fig. 57. 18; Drawing Tiryns Archive no. 7/21
19. 9	Deep Cup FS 215. type SB	Zwinger	LXI 41/43 XVIb; Horizon 17a0	Podzuweit 2007, fig. 57. 9
20. 1	Medium Band Deep Bowl FS 284	Building I, Room 9	LXI 39/11 IXf; Horizon 18	Drawing Tiryns Archive (without number)
20. 2	Deep Cup FS 215	Building I, Room 10	LXI 38/81 IXe; Horizon 17a4	Drawing Tiryns Archive no. 4/16645
20. 3	Medium Band Deep Bowl FS 284	Building Vl, Room 122	LXI 41/59 XI; Horizon 17a4	Podzuweit 1979*a*, 415 fig. 36. 5
20. 4	Deep Cup FS 215	Building VI, Room 122	LXI 41/58.59 XI; LXI 41/06 Xd G 32; Horizon 17a4 and 19ba (G 32)	Podzuweit 1979*a*, 415 fig. 36. 3
20. 5	Carinated Kylix FS 267	Building VIII, Room 15	LX 39/80 XVI; Horizon 17a0	Drawing Tiryns Archive no. 11/224
20. 6	Carinated Kylix FS 267	Building VI, Room 122	LXI 41/69 XI; Horizon 17a4	Podzuweit 1979*a*, 415 fig. 36. 1; Drawing Tiryns Archive no. 3/-

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21. 1 = fig. 6. 1
21. 2 = fig. 18. 1
21. 3 = fig. 6. 2

21. 4	= fig. 18. 2			
21. 5	= fig. 6. 4			
21. 6	Deep Bowl FS 284. type B	Room 215	LXII 43/31 XVIb; Horizon 16a1	Schönfeld 1988, 178 fig. 7. 6
21. 7	= fig. 18. 5			
22. 1	= fig. 7. 3			
22. 2	= fig. 18. 6			
22. 3	= fig. 7. 4			
22. 4	= fig. 18. 3			
22. 5	= fig. 18. 4			
23. 1	= fig. 8. 4			
23. 2	= fig. 19. 1			
23. 3	= fig. 8. 6			
23. 4	= fig. 8. 5			
23. 5	= fig. 19. 8			
23. 6	= fig. 8. 3			
23. 7	= fig. 20. 6			
24. 1	= fig. 8. 1			
24. 2	= fig. 20. 1			
24. 3	= fig. 14. 5			
24. 4	= fig. 14. 3			
24. 5	= fig. 19. 4			
24. 6	= fig. 5. 3			
24. 7	= fig. 19. 6			
24. 8	= fig. 15. 1			
25. 1	Shallow Bowl FS 296. added white	Tiryns, Epichosis	Epichosis Z 70/176	Podzuweit 2007, fig. 38. 1
25. 2	Shallow rounded bowl FS 295B	Mycenae, Perseia	Trench L (W) 1953; BE No 6073, Phase 0830	E.B. French 1969, 84 fig. 10. 6
25. 3	Shallow rounded bowl FS 295B	Tiryns, Unterburg	= fig. 15. 1	
25. 4	Shallow Bowl with slight carination FS 295A	Mycenae, West Complex, Room xxxiii	Ex No 66/462/1402; BE No 16353; Phase 0932	Mountjoy 1986. 153 fig. 197. 1; WBM 16/17
25. 5	Shallow Bowl with slight carination FS 295A	Tiryns, North-Eastern Lower Town	LXVIII 30/98 IX; Phase 1 (with Post-Mycenaean intrusions)	Stockhammer 2008. pl. 43. 1066
25. 6	Shallow Bowl with sharp carination FS 295C	Mycenae, NE Sector, Room xlii	Ex No 62–422; BE No 16008, Phase 1131/1132	Mountjoy 1986. 179 fig. 233. 1; WBM 16/17
25. 7	Shallow Bowl with sharp carination FS 295C	Tiryns, North-Eastern Lower Town	LXIX 30/46 VIII; LXIX 30/57 VIII; Post-Mycenaean disturbed context	Stockhammer 2008. pl. 73. 1568

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MYCENAE REVISITED PART 1. THE HUMAN REMAINS FROM GRAVE CIRCLE A: STAMATAKIS, SCHLIEMANN AND TWO NEW FACES FROM SHAFT GRAVE VI[1]

1. Introduction: Why, When, and Who (by A.J.N.W. Prag)

During the Mesohelladika conference organized by the French School in Athens in 2006, Dr Papazoglou-Manioudaki approached me and said: 'During the recent building work in the National Archaeological Museum we found two more skeletons from Grave Circle A at Mycenae. They were excavated by Stamatakis in Shaft Grave VI in 1877 after Schliemann had left. We found them in the wrong apotheke, with the Classical sculpture, and I think they must have been put there when the collections were brought out of hidden storage after the Second World War. I have been saving them up for you: would you like to study them?' Only a fellow curator could understand (all too easily) how such an item could have been put into 'the wrong store-room' and then overlooked; a fellow curator who had himself just been through the trauma and upheaval caused by a major development project could also understand that this was the moment when such long-mislaid treasures might be revealed; but the archaeologist behind the curator had to recover from his dream-like trance and ask his colleague to repeat the statement before he could absorb it properly.

Dr Papazoglou-Manioudaki's proposal sprang from the fact that my colleagues and I had already reconstructed the faces of seven individuals buried in Grave Circle B in a project to identify kinship through facial similarity, and were in the process of taking this further by now studying the DNA of individuals buried in both Grave Circles at Mycenae and at a number of other sites in the Aegean; indeed, it was because we were presenting a paper on the DNA work that I was attending the conference—the final report on that work appears elsewhere in this volume (Bouwman *et al.* 2009; also ead. *et al.* 2008; Brown *et al.* 2000; Chilvers *et al.* 2008; for the Grave Circle B reconstructions, Prag *et al.* 1995; Prag and Neave 1997/9, 105–45).

[1] This work could not have been done without a British Academy Small Research Grant awarded to A.J.N.W. Prag, supplemented by funds from the Skull Account of the Manchester Museum, and we owe grateful thanks to both bodies for their support. Like so many research projects undertaken through the good offices of the British School, we have a great debt of thanks to Helen Clark for 'fixing everything', and for being so much more than just a fixer. Dr Papazoglou-Manioudaki wishes to thank Dr E. Kourinou, Head of the Sculpture Collection in the NAM, for her help with retrieving the bones from the Sculpture apotheke, Professor Sp. Iakovidis for his comments on the drawing of Grave VI and Alex. Kotsaki, conservator in the Egyptian Laboratory of the NAM, for the conservation of the drawing, and the German Archaeological Institute in Athens for permission to publish the photograph in FIG. 1. She also wishes to thank Kl. Valtin von Eickstedt for making the photographs of the bones from Shaft Grave VI and for scanning other images. Other photographs were taken by members of the team or by the photographers at the NAM, for whose help we are most grateful. Dr Musgrave would like to record his thanks to Professor Ian Silver and Professor Tony Waldron for help with interpreting the nicer points of the anatomy. We are also grateful to the BSA's two referees, Drs Oliver Dickinson and Sevasti Triantaphyllou, for their helpful comments and for picking up some of our errors. It is as a result of their comments that we decided to expand our original article into separate pieces and extend it over several issues of the *Annual*. The work was described at an Upper House seminar at the School in October 2008, and the comments of that audience have been most helpful and led to several minor revisions. Finally, the other five authors would in their turn like to record their gratitude to Dr Papazoglou-Manioudaki and her colleagues in the NAM for asking us to come in the first place, and then for working so hard to make our sojourns in the museum so easy, so effective, and so much fun.

However, the remains from Schliemann's excavations in Grave Circle A, although still suitable for DNA sampling, had proved to be in much too poor condition for any facial reconstruction, and we believed that that particular door had closed for ever. Now, beyond all hope, the Fates and our kind colleague at the National Archaeological Museum (henceforth NAM) were offering us a second chance. What followed is described in this article.

With the support of a Small Research Grant from the British Academy, a small team comprising Richard Neave, Avril Neave, and Denise Smith, all now from the RN-DS Partnership, Dr Jonathan Musgrave (University of Bristol), Sarah Musgrave (Open University), Dr Argyro Nafplioti (then at the University of Southampton), and I spent two weeks in February and March 2007 studying the human remains from Shaft Grave VI in the NAM alongside Dr Papazoglou-Manioudaki; most of us had already worked on the Grave Circle B reconstructions. At Dr Papazoglou-Manioudaki's invitation, Dr Nafplioti returned later to re-assess the human remains from the other graves in Circle A excavated by Schliemann in 1876 and now kept in the NAM, and we also discussed the possible remains of the 'mummy' from Shaft Grave V. From this grew a series of a series of articles to be published in this and following issues of *BSA* under the overall title of 'Mycenae Revisited', of which this is the first. Also in this issue is Argyro Nafplioti's study of the potential of strontium isotope ratio analysis for understanding the origins of the individuals from Grave Circle A ('Mycenae Revisited Part 2'). These will be followed by a catalogue and reappraisal of all the human remains from Grave Circle A by Jonathan Musgrave and Argyro Nafplioti (Part 3), and by an article dealing with the problem of the 'mummy' from Shaft Grave V by Lena Papazoglou-Manioudaki and Argyro Nafplioti (Part 4). Finally, we plan 'Mycenae Revisited Part 5' as a reassessment by Oliver Dickinson and Lena Papazoglou-Manioudaki of the occupants and the use of the graves in Circle A in the light of the new discoveries.

The often stormy and always colourful story of Schliemann's excavations at Mycenae has often been told and debated (e.g. Demakopoulou 1990*a* and the other contributions to the centenary volume), and it is not necessary to repeat it here, nor to discuss the implications for the story of the Late Bronze Age in the Aegean. The results presented here begin with the story of Stamatakis's often undervalued and unappreciated role in the excavations at Mycenae and his discovery of Shaft Grave VI, and move on to the rediscovery of the human remains from that grave in the NAM. We then describe the reconstructions of the faces of the two individuals buried in the grave, supported by detailed anatomical notes on their skeletal remains.

2. Panayiotis Stamatakis and the Excavation of Grave VI at Mycenae (by Lena Papazoglou-Manioudaki)

Panayiotis Stamatakis has been an underrated and elusive figure in nineteenth-century Greek archaeology. Information on his life and work, provided by the archives of the Archaeological Society, reveal that Stamatakis was much more than Schliemann's supervisor at Mycenae, and an accomplished archaeologist on his own right (Petrakos 1987*a passim*, esp. 279–82; 1987*b*, 75–7, 80–5, 100–4, 135). He overcame his lack of professional training, as did many of his contemporaries, by sheer hard work, study and devotion to the task of excavation and preservation of archaeological sites. Since 1866 he had worked for the Archaeological Society and the Archaeological Service and conducted important excavations in Boeotia (Chaironeia,

Tanagra, Thespiai), Delphi, and Delos and Mykonos in the Cyclades, where he had drawn the first archaeological maps of the islands (Vasilikou 2006, 16–23, 100–3). Beside his important work at Mycenae, his main contribution to Aegean archaeology is the excavation of the tholos tomb at the Argive Heraion and of the Spata chamber tombs in Attica (1877), where the plans and sections of the tombs were made by the architect Ernst Ziller (Koumanoudis and Kastorchis 1877). His comments on the relative chronology of the finds are surprisingly accurate when he states that the Heraion tholos, the Atreus tholos, and the tombs at Spata are later than the graves in the Acropolis at Mycenae, although they all generally fall within the same chronological range (Stamatakis 1878, 271–86, esp. 278).

A senior and trusted member of the Archaeological Society, he was promoted to the rank of General Ephor of Antiquities in the Archaeological Service in 1884. He died prematurely from malaria in 1885, owing mainly to his relentless work in unhealthy places. He was never able to publish the material which he was engaged in preparing. On his tomb in Athens, now gone, was erected a stele designed by W. Dörpfeld.

In 1876 Stamatakis was appointed representative of the Archaeological Society at the excavations of Mycenae conducted by Heinrich Schliemann (Petrakos 1990). His controversy with the flamboyant personality of Schliemann has earned him a prominent place in studies aimed at discrediting Schliemann's work at Mycenae (Calder and Traill 1986, *passim*; Traill 1995, *passim*). Few if any scholars are aware of his painstaking work of describing the graves and the finds, and writing extensive reports, in his careful and clear handwriting, including valuable draft drawings of Grave Circle A and of the graves themselves. Moreover, in these reports there is a wealth of information about the excavation of the Acropolis at Mycenae, and the clearing and partial restoration of the grave circle and of the Atreus tholos, including catalogues of the finds (Tsountas and Manatt 1897, 72; Demakopoulou 1990*a*, 101).

The study of this important material, now housed in the archives of the NAM, may solve problems concerning the excavation and also provide the corroborating evidence of an eyewitness for the provenance of the finds. In fact irrefutable evidence has already been published—most recently by Dickinson (2005)—against the unjustified allegations about the authenticity of the golden masks, especially the one dubbed the 'mask of Agamemnon'.

Schliemann mentioned Stamatakis once, rather contemptuously, in his book *Mycenae* as 'a government clerk of the name of Stamatakes' (1880, 352–62). This attitude changed after Stamatakis's death, when Schliemann regrets the loss of a 'distinguished archaeologist' (1886, liv, 368). The original photograph (FIG. 1) of the excavation of Grave Circle A, now in the archive of the German Archaeological Institute, depicts a figure in formal dress in front of the parapet that might be identified with Stamatakis (Petrakos 1987*b*, 100, pl. 38; Demakopoulou 1990*a*, esp. 90). The fact that this figure was omitted in the published engraving in *Mycenae* (Schliemann 1880, pl. 7) is taken as evidence of the bad blood that existed between the two men. It has also been suggested that because this is a composite photograph the figure could be Schliemann himself, and that like the figure of Sophia, which appears in some versions, it was cut out simply to avoid duplication (Traill 1995, 155–6, pls. 13–17).

After the departure of Schliemann on 4 December 1876, Stamatakis excavated the Acropolis Treasure at Mycenae (Thomas 1938–9, 65), and after their short stay in the National Bank he was responsible for the transfer of all the finds from the graves to the Polytechneion (Athens Technical University) next to the NAM building (Koumanoudis 1878, 24–5). In the same year (1877) Stamatakis excavated the chamber tombs at Spata. In

November 1877 Stamatakis returned to Mycenae and excavated the sixth grave in Circle A, a fact immediately announced in the press, in the newspaper *Palingenesia* for 24 November (Korres 1974, cat. no. 670). Its dimensions are 3.50 m × 2.90 m and it is the closest grave to the entrance of the circle. The row of slabs passes across one angle of the grave (FIG. 2). It was

FIG. 1. Excavation of Grave Circle A, 1876 (archive of the German Archaeological Institute, Athens).

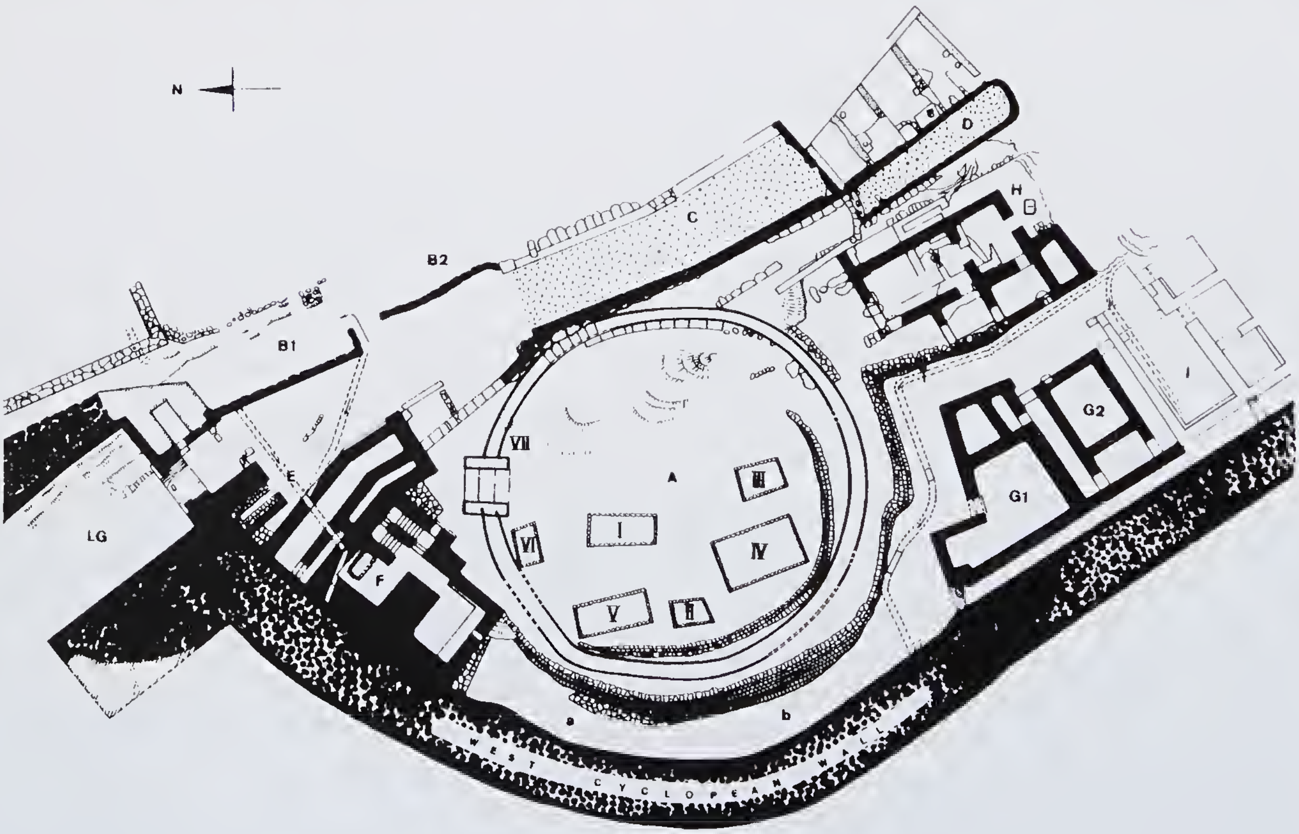


FIG. 2. Plan of Grave Circle A. After Iakovidis 1983, plan 6.

discovered when Stamatakis was conducting clearing operations in the area (Iakovidis and French 2003, 18, plan 2). In his report, written in January 1878 at Charvati (Mycenae) after the excavation, he gives an account of his work at Mycenae from 10 November 1877 to 15 January 1878 (FIG. 3). Grave VI covers seven pages of the report.

He describes the grave in detail (FIG. 4, the full text) and provides a draft plan with comments, attributing the finds to each of the two individuals (X and Ψ) buried in the grave (FIG. 5). He states that one of the dead (X) was actually *in situ* and the bones of the other, to the right of the first, were found in a pile, and assumes that they were not buried simultaneously. A gold cup and gold jewellery along with fragments of decayed silver and bronze vases lay to the left of skull of the individual X, together with bronze swords and daggers with rivets of gold-plated bronze. On the floor of the grave he mentions a layer of pebbles and clay that covered the finds (apparently clean earth that had filtered into the grave). All the pottery was piled against the narrow west side of the grave, at the feet of the deceased. On top of the grave a broken unsculptured slab was unearthed (Tsountas and Manatt 1897, 91,157; Younger 1997, 238). Stamatakis states, this time in agreement with Schliemann, that the bones of the dead had been burnt. The decay of wooden objects or support beams from the roof may account for the 'black ashes' found in the graves that led to this conclusion (Åkerström 1978, 40). This assumption, which was also applied to the tomb

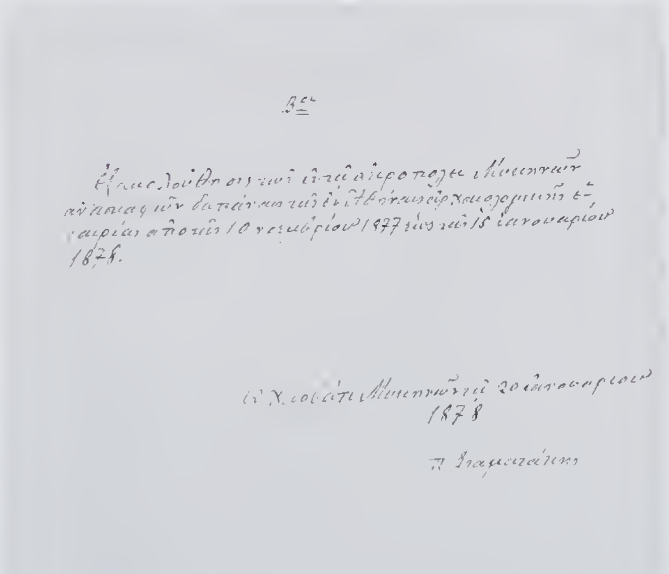


FIG. 3. Stamatakis's account of Grave VI.

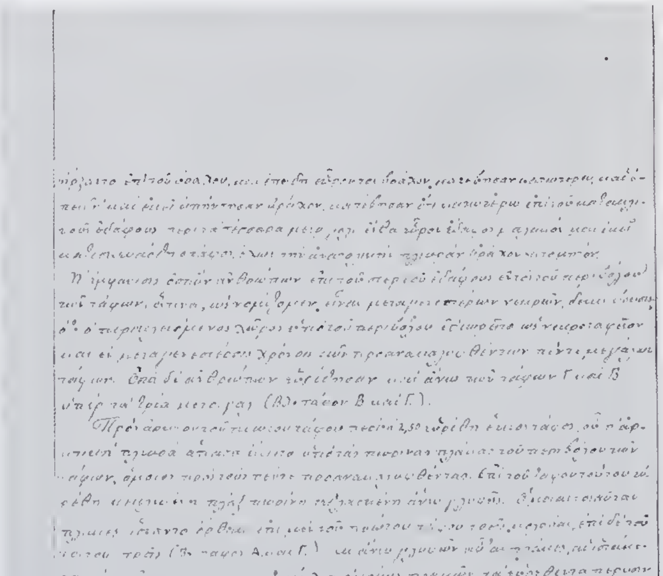


FIG. 4. Stamatakis's handwritten report (1877/8).

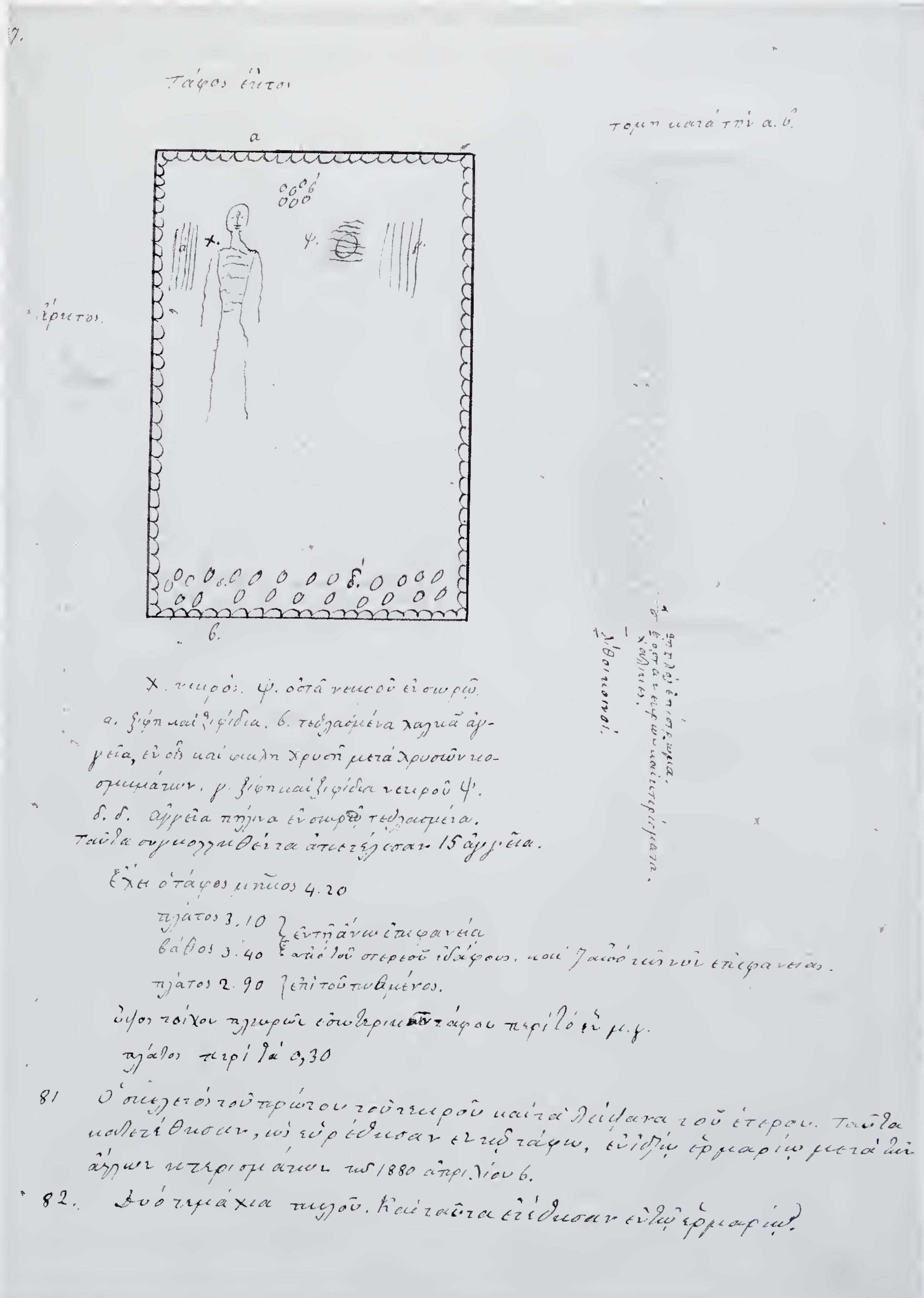


FIG. 5. Stamatakis's plan and section of Grave VI.

at Spata, puzzled Schliemann's and Stamatakis's contemporaries, who insisted on the obvious fact that only inhumations were attested in all the other graves of the same era, and that therefore the same must be true for the graves excavated by Schliemann and Stamatakis (Kondakis and Kastorchis 1878, 200–1; Tsountas 1888, 131–4). According to the same report, the bones and the burial gifts, along with lumps of clay and pebbles, were transferred to the Athens Polytechneion in June 1878 and then arranged by Stamatakis 'as found' in their own case in April 1880. The case containing Grave VI occupied the centre of the room dedicated to the finds from the Shaft Graves (FIG. 6; Milchhöfer 1881, 88 [plan], 104–5). The Polytechneion remained their home until 1892 and special cases were ordered by the Archaeological Society so that the finds would be properly stored and be accessible to scholars and the public (Koumanoudis 1892, 61–2; 1893, 24; Philips 2006, 153–4 gives an account of Flinders Petrie's visits to the 'Polyteknikon').

From the time of its excavation, Grave VI has been part of the legacy of the Shaft Graves of Grave Circle A. It does not belong to the group of the rich graves III, IV, and V but nevertheless the two individuals in Grave VI are well furnished with gold, silver, bronze, and ivory, including a gold cup and a wealth of bronze weapons (Velsink 2003, 12–13, 29; Karo 1930–3, 160–6; Kilian-Dirlmeier 1986, 161–7; 1988, 161–72; Graziadio 1991, 432–4). The collection of pottery in the grave provides a closed group of Polychrome Mainland Ware, Cycladic, and Minoan pottery, typical of the diversity of the Late Helladic I period (Dietz 1991, *passim*; Mountjoy 1999, 83–4).

The excavation of Grave VI is only briefly mentioned on page 25 of the *Praktika* of 1878, and four years later Schliemann gave a catalogue of the more important finds, including the bones, in his short guide *Trésors de Mycènes* (1882, 48–9). Schliemann died in 1890, and in 1891 Schuchhardt speaks for the first time of 'shaft graves', adopts the numbers given to them by Stamatakis, and gives an account of grave VI (1891, 312–16).

The finds from the Shaft Graves along with their cases were transferred to the NAM in 1892 and exhibited in the grand central hall, now known as the Mycenaean Gallery (Koumanoudis 1892, 61–2; 1893, 24). Selected objects from the excavations at Mycenae and Tiryns were depicted on the fresco paintings on the walls, made after drawings by G. Kawerau (Kavvadias 1914, 217). The archaeological guides to the NAM all make reference to Grave VI and all make the point that the bones of the two individuals and the burial gifts are exhibited 'as found' (Kavvadias 1894, 20–1; Stais 1909/1915, 62–4/72–4; 1926, 72–4 with a picture of the case; Philadelpheus 1928, 329; 1935, 63–4).

J. L. Angel studied the bones in 1937; a copy of his original reports and photographs is kept in the archive of the Prehistoric Collection of the NAM. His report was only published in 1973, along with his study of the bones from Grave Circle B (Angel 1973, 384, pl. 248). During World War II the finds from Grave VI and the bones were hidden: they were then deposited in the storerooms of the Sculpture Collection in the NAM, resting on glass panels apparently from the same case that appears in the guide books. This element and the old photographs by Angel helped the identification of the bones as those from Grave VI in 2003. Although disturbed, the bones are still the best preserved in the Grave Circle (FIG. 7; Papazoglou-Manioudaki in press). The lumps of clay, preserving black spots on the surface, the pebbles, and some small pieces of ivory mixed with bones are still there.

At the same time in 2003 another important piece of evidence came to light at the bottom of a box in the storerooms of the Prehistoric Collection in the NAM: a detailed plan of Grave

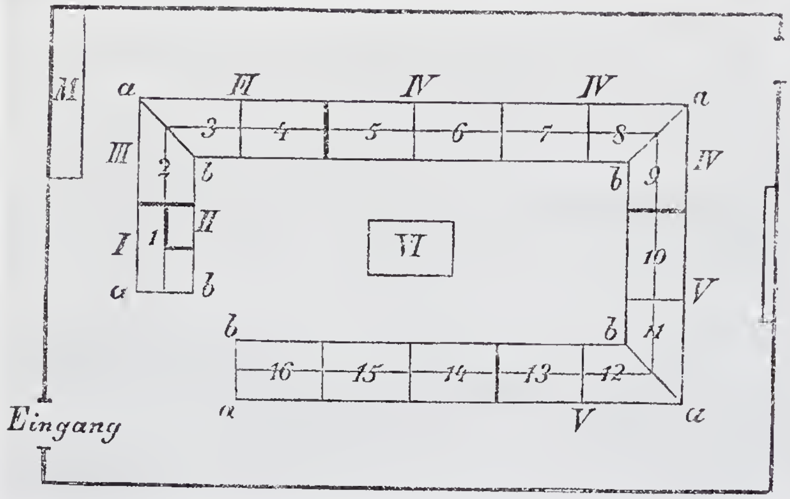


FIG. 6 (left). Plan of the exhibition hall at the Polytechneion (after Milchhöfer 1881).
FIG. 7 (right). The bones of the two individuals buried in Grave VI, in 2003.
Those of individual 1 are on the left-hand panel.

VI, drawn in ink on paper and partly decayed (FIG. 8). Two black and white photographs, found alongside, reveal that the drawing was already decayed when the pictures were taken. On the back of the photographs are the words 'Σχεδιάγραμμα 6ου Βασιλικού τάφου' ('Plan of the 6th Royal grave') in the handwriting of G. Mylonas. Some draft notes concerning the preparations for the publication of Grave Circle B provide further evidence that the photographs should be dated to the 1960s when Mylonas was working in the storerooms of the Prehistoric Collection. The date of the original drawing is a more complicated matter. It is obviously older than the photographs and it may represent the display of the finds from Grave VI in the NAM before World War II. The numbers on the objects and on the skeletons (920–1) correspond to inventory numbers of the Prehistoric Collection and to Karo's publication. It seems that the numbers were written at a later time after the completion of the drawing, and there is doubt about certain numbers with question marks (e.g. 904). The objects marked with letters may be identified with inventory numbers: e.g. 'A' corresponds to the dagger inv. no. 904. The dagger '904(;)' is actually dagger 906 while the sword numbered '906(;)' corresponds to the sword 926 and so on.

It is evident that the drawing was not made during the excavation and should be used with caution. A few further points may be made. The bronze sword with gold-plated nails, 70 cm in length, is ascribed by Stamatakis to the individual X (920). It can easily be identified with inv. no. 925, although in the drawing it is closer to individual Ψ (921). According to Stamatakis's report the bronze pin (924) belongs to individual X, although in the drawing it is part of the burial gifts of Ψ. In other cases, however, he writes that an ivory pommel (936) was found apart from the swords or that the stone matrix (934–5) and the sharpeners (929–30) are found with skeleton X, in agreement with the drawing. The identification of the bronze weapons poses difficulties because their description in the report is not detailed (only one measurement is provided) and because since then they have undergone extensive conservation work. The gold items and the dagger 928, the one with prominent conical gold nails and a corroded blade that gave rise to the short-lived theory of a northern import, are

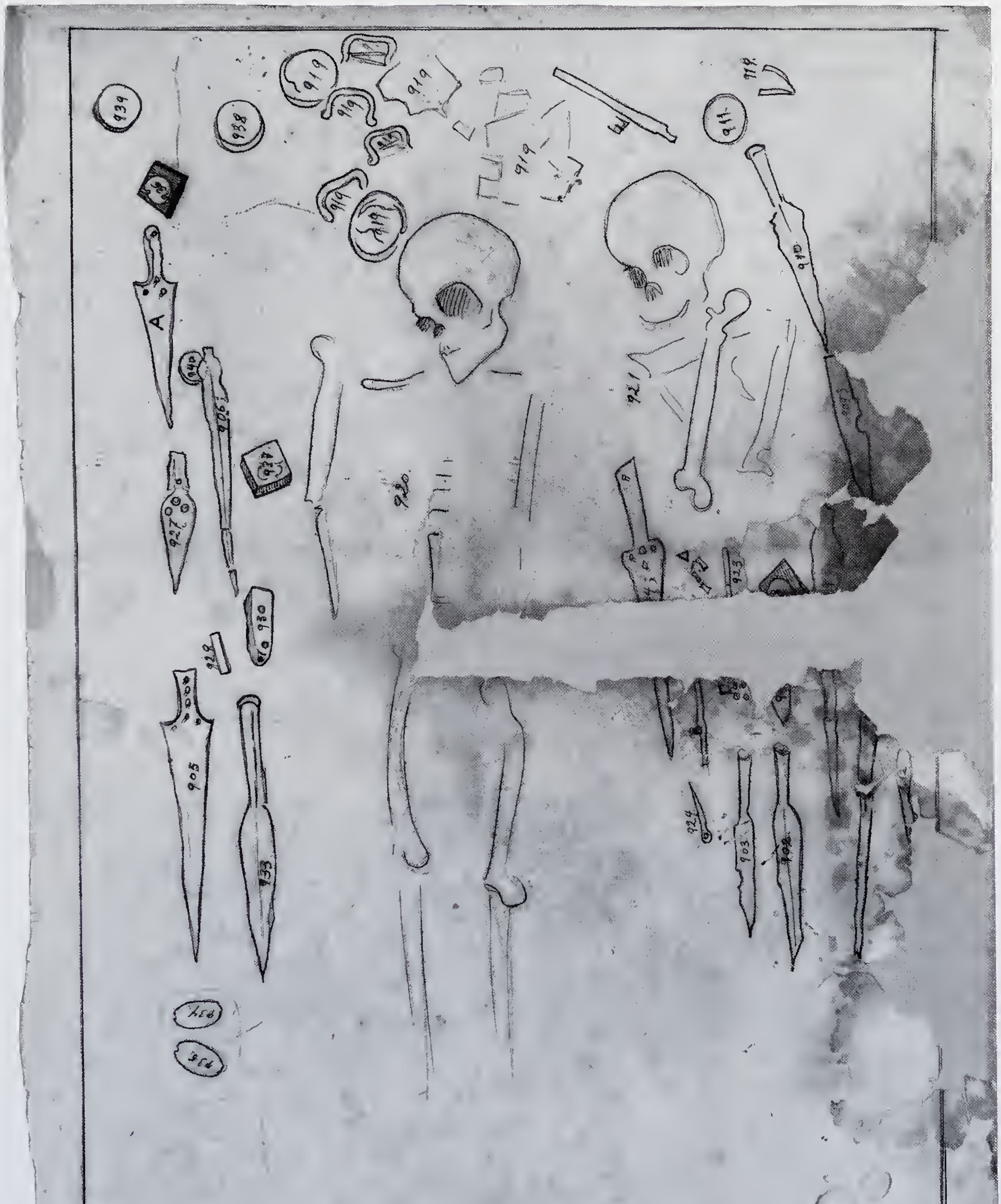


FIG. 8. Plan of the remains in Grave VI. Individual 1 is on the right.

not depicted in the drawing, although clearly described in Stamatakis's report as belonging to the individual X (Blegen 1941, 423–8; Papadopoulos 1998, 12 and pl. 8, no. 50). The same is true for the rest of the finds. In a photograph from the early twentieth century of case no. 50 containing the finds from Grave VI in the Mycenaean Gallery of the NAM, some of the vases at least are shown at the feet of the two skeletons (FIG. 9). The rest may have been on display on the upper shelf of the same case.

To sum up, the use of evidence from unpublished reports gives an insight into the pioneering work of a nineteenth-century archaeologist not only as an excavator but also his efforts to secure the finds for posterity. A hitherto unknown drawing may represent a step towards the publication that he never accomplished. Besides the anthropological and osteological studies reported later in this article, the rediscovery of the best-preserved skeletal remains of all those buried in Grave Circle A gave the opportunity for the reconstruction of two faces from Grave Circle A, an achievement that was not considered feasible a few years ago because of the poor preservation of the other skulls (Prag *et al.* 1995, 107).

3. The Reconstruction of Two Mycenaean Heads from Shaft Grave VI (by R.A.H. Neave and Denise Smith)

A. PREPARATION OF THE SKULLS

The condition of the remains

The three-dimensional reconstruction of a head and face on a skull requires that an accurate facsimile of the bony skull be prepared. There are several ways in which this can be achieved.

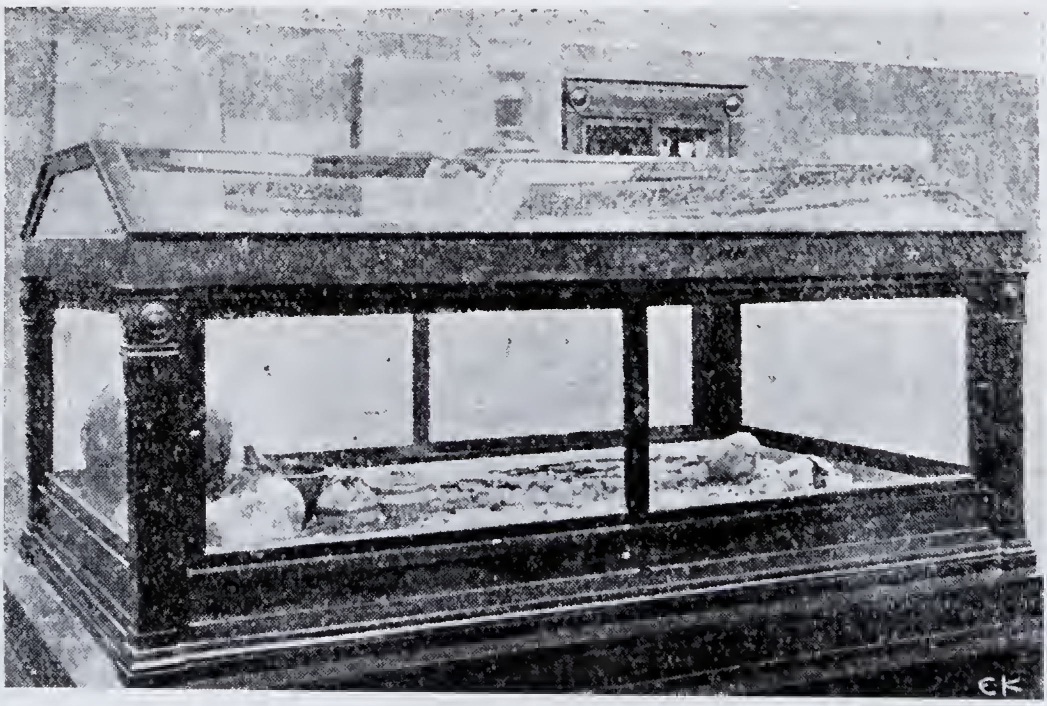


FIG. 9. The display of Grave VI in the Mycenaean Gallery of the National Archaeological Museum before World War II. After Stais 1926, 72.

The most satisfactory method is in many cases now for the remains to be scanned and for the facsimile to be produced from the digital data acquired by some form of rapid prototype modelling technology. In the absence of such facilities, it is still necessary for a cast to be prepared from the original specimen: obviously it is not acceptable to subject the original itself to the stresses and intrusions of the actual reconstruction process. In this instance, as in so many cases, the condition of the skeletal remains was poor, inasmuch as they were fragile and of a somewhat porous nature. Furthermore, the maxillae of both skulls had become separated from the cranium and areas in the region of the zygoma were missing; sections of the mandibles were also missing.

Preparation of remains prior to casting

Using techniques developed in 1987 (Prag and Neave 1997/9, 20–40, 100), each individual piece of the remains was covered with a very thin layer of aluminium foil, this being burnished on with a soft cloth and held in place with small pieces of adhesive tape.

Casting of remains

Moulds were then prepared of each separate piece using a mixture of quick-setting alginate. The alginate provides a soft, flexible mould which is in turn supported by a plaster 'mother mould'. The objective is to achieve an extremely accurate mould of the original bone whilst at the same time making sure that the bone itself is not damaged. The mould and its outer casing around the specimen once created, the specimen is then removed. During the removal it is occasionally necessary to sacrifice the mould in preference to risking any damage to the original specimen. A second mould can always be attempted, but there is only one original that cannot be replaced once damaged. Once the moulds have been completed, plaster copies are then prepared. In many cases only one useful copy can be achieved using this technique. It is, however, quick, safe and can be carried out either in the laboratory or in the field.

Setting up the casts

In both cases the cranium was complete. Each was mounted securely in as near to the 'Frankfurt plane' as could be estimated: this is a conventional setting for the head where the line between the lower edge of the eye-socket and the ear-hole is parallel to the ground. The maxillae were then located in their correct position in relation to the crania and attached using lengths of steel wire. Using a firm modelling wax, those areas that were missing (the zygoma and infraorbital margins) were re-created, continuing as far as was possible the angles and anatomical forms of the existing bones to complete the skull. A similar exercise was undertaken with the mandibles. The teeth were placed in occlusion and again the missing areas were rebuilt in wax to a point where the mandible looked normal and complete.

By following a process of offering up the lower jaw to the upper jaw modifications could be made where necessary to ensure that the temporo-mandibular joints were located in their correct positions.

B. CONSIDERATION OF AGE AND SEX

Our colleagues established that the sex of the two skeletons being examined was male, and the ages 20–25 and 25–35 respectively. Accordingly, soft tissue measurements were chosen to

reflect this information, and small pegs were inserted into the skulls at specific anatomical points, each of which represented the average thickness of soft tissue at those particular anatomical points for males between 20 and 35.

C. RECONSTRUCTING THE FACE

Positioning the eyes and developing the cartilaginous structures of the nose

Having completed these processes, the skull, complete with its measured pegs, was ready for the soft tissue to be rebuilt upon its surface.

Initially the eyes were positioned within the orbital cavity. A number of key anatomical details were either lacking or difficult to locate, particularly those relating to the lachrymal fossa (which is key to locating the inner canthus of the eye) and to Whitnall's tubercle (the small prominence on the medial surface of the lateral wall of the orbit which indicates the level of the outer canthus). The positioning of the eyes in both these skulls is therefore based upon the limited information available from the skull itself and an informed assessment of the most likely position of these anatomical points.

The shape and position of the nose, which is governed by the piriform opening on the skull, the nasal bone, and the anterior nasal spine, presented rather less of a problem as the piriform opening itself and the anterior nasal spine were largely intact. Unfortunately, as so often occurs, the nasal bone was largely absent, although the root in the region of the nasion was present. Using the skeletal information available, the cartilaginous structures of the nose were then developed.

Development of the musculature of the face

A similar problem to the positioning of the eyes was encountered with a number of the facial muscles whose origins arise from the zygoma, which was absent in both cases, and with the mandibles, which again had suffered considerable damage in one instance.

Despite the limitations relating to the individual landmarks, there proved to be a reasonably satisfactory armature upon which the facial muscles could be built. Accordingly, using established techniques (e.g. Prag and Neave 1997/9, 26–33) the facial muscles were developed over the surface of the skull using a soft modelling wax. This is something of a departure from earlier techniques in which modelling clay was used throughout the reconstruction process. This more recent approach enables fine structures to be developed much more easily, providing an opportunity for group discussion and consideration as the material being used is quite stable, unlike clay which is prone to dry quickly, particularly in a warm, dry climate. After development of the underlying muscular structures, soft clay was then used to develop the subcutaneous tissues.

Development of subcutaneous tissue and skin

The subcutaneous tissue is a mixture of fat, connective tissue, muscles, nerves, and glands. These structures are not individually rebuilt, but taken collectively have the effect of providing a relatively smooth cushion around and above the musculature, over which lies the epidermis (the skin).

Completion of the head: eyebrows, hair, forehead creases, etc.

The controlled scientific build-up from skull to subcutaneous tissue is a relatively straightforward technique. Although technically it is sometimes difficult to achieve satisfactorily, the basic concept is simple to understand. However, the final stage is perhaps the most difficult to achieve, and the most controversial, there being very little scientific information available to give guidance as to the final appearance of a reconstruction. Whilst the position and general distribution of skin folds and creases on the face can be understood, the absence or presence of such folds cannot be predicted, any more than the exact shape of the eyebrows or the hairline, the exact shape of the vermillion margin of the lips, the width of the philtrum (the vertical groove in the upper lip), or the shape of the ears. Such features can only be developed based on what might reasonably be expected from a particular individual at a particular age in life from a particular racial group who has led a particular lifestyle.

Taking all these factors into consideration, it becomes obvious that any reconstruction can never be a totally accurate portrait of the individual when alive. With good material a reconstruction will routinely have a reasonable similarity to the appearance of that individual when alive, and controls of various kinds carried out over the years as well as the evidence of successful forensic identifications reported in *Crimewatch UK* and in other news media have demonstrated that one can have a high degree of confidence in the results (e.g. Prag and Neave 1997/9, 33–40, 228–30). One should of course always bear in mind that in the legal and forensic context it is always necessary to have *two* forms of evidence to confirm identification, and that thus facial reconstruction on its own cannot be conclusive any more than (say) dental evidence. Therefore it is important to have confirmation from the DNA evidence as in the case of two reconstructions from Circle B mentioned in the next section: but we cannot and do not claim that facial reconstruction on its own is the magic bullet any more than any other technique. In this case the basic material—the skulls—was not in perfect condition, for bone was missing at some points. Inevitably this will limit the degree of certainty regarding the similarity of the reconstructions to the individuals when alive. Nonetheless the shape and proportions of the heads and faces are controlled by the bony remains, and while there may not be complete certainty over the soft tissue details, the broad overall appearance of the reconstructions provides a reasonable indication of the general appearance of these two individuals when alive. The faces are presented here as clean-shaven and with non-specific hairstyles (PLATES 25–26): this avoids the distraction of beards and more studied hairstyles, but these can always be added later if the need arises—for a discussion see Prag *et al.* 1995, 122–5; Prag and Neave 1997/9, 130–1, 135.

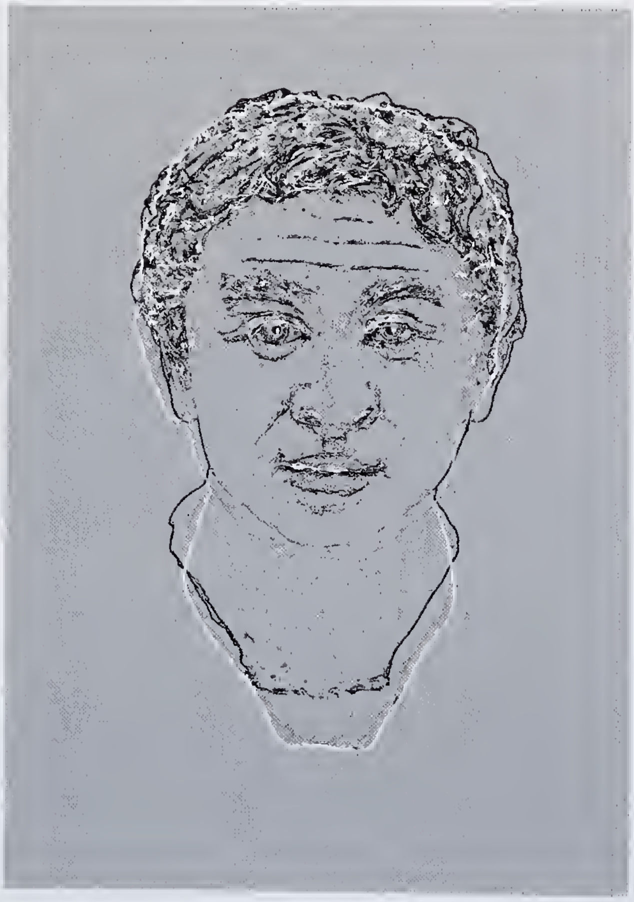
D. FACE MAPPING

Part of the object of this whole exercise had been to see whether facial similarity would give any clues to possible kinship both between these two new individuals and between them and the seven people from Grave Circle B whose faces we had reconstructed twenty years earlier, and where we had identified a number of different facial types and groupings; in one case this was subsequently borne out by DNA testing (Prag *et al.* 1995; Prag and Neave 1997/9, 105–45; Bouwman *et al.* 2008; ead. *et al.* 2009; Brown *et al.* 2000). At this point it is perhaps worth noting too that these new reconstructions were carried out by two different people and therefore the following exercise is less likely to be compromised by the danger that one hand always produces the same type of work.

In an attempt to try to understand whether these two individuals could have been related, a number of tests were undertaken similar to those used in forensic face mapping in order to compare the proportions and the morphology of the two heads (Neave 2004, 277–86). We have already noted that there are absences of bone at specific points that may have limited the certainty of the accuracy of the reconstructions: thus whilst some of the morphology may be more questionable, the overall bony architecture of the faces remains constant.

Photographs were taken of each of the reconstructions, both frontal and lateral, and rendered as find-edge outlines. These outlines were then superimposed one upon the other (FIGS. 10–11). It was immediately obvious that the proportions of the two faces were extraordinarily similar. In both projections the overall shape of the head and the position of the eyes, nose, and mouth, together with the general shape of the chin, were all consistent one with the other. Whilst acknowledging that a degree of subjectivity must surround details such as the apex of the nose and the shape of the mouth, their position cannot be questioned. Whether this degree of similarity between the two represents any form of kinship is debatable, and cannot be established for certain by this form of study. It does nevertheless suggest that both individuals are likely to have common ancestry.

However, their faces do not show any significant similarities with any of the seven faces which we reconstructed from Grave Circle B beyond those general ones which one might expect to find in any close-knit community, and therefore the question of kinship links



FIGS. 10–11. Face-mapping of the two heads from Shaft Grave VI: the white lines show Head 2 overlaid on Head 1 in black (FIG.10) and Head 1 overlaid on Head 2 (FIG.11).

between the two circles has to remain open: neither the facial evidence nor the DNA have so far been able to answer this for us (Bouwman *et al.* 2009). Tempting though it would have been to apply face-mapping between the two groups, there is little to be gained by such an exercise, not least because in every case but one the mandibles of the skulls from Circle B had to be reconstructed from Angel's photographs and measurements. While this was more than adequate to create a plausible and accurate reconstruction, it would not have supported the precision needed for convincing comparative face-mapping.

4. Report on the Human Skeletal Remains (by J.H. Musgrave and A. Nafplioti)

INTRODUCTION

Shaft Grave VI contained the skeletal remains of two individuals and the left zygomatic bone of a third.

1. The articulated burial of Individual 1 is the primary one (FIG. 12). It was disturbed to make room for that of Individual 2, which is secondary and post-dates it. Individual 1 was male and 20–25 years old at death. His stature could not be calculated.
2. Individual 2 was also probably male, no older than 35 years at death, and 1.65 m tall (FIG. 13).
3. The isolated left zygomatic is most probably from an earlier burial from the same group, left behind when the grave was prepared for reuse in accordance with normal Middle and Late Helladic practice (e.g. Mylonas 1983, 27, 58).

RÉSUMÉ OF ANTHROPOLOGICAL FINDINGS

Shaft Grave VI, Individual 1

Individual 1 is represented by 50% of the skeleton of a young man who died at the age of 20–25. The cause of his death could not be established. There was some periosteal new bone and an elongated perforation on his left frontal bone. The aetiology of both conditions remains unknown. The 24 teeth recovered are generally in good condition, but at least three seem to have been chipped in life. Two possibly activity-related skeletal modifications were observed. However no signs of articular pathology were recorded, which is unsurprising given his age.

Shaft Grave VI, Individual 2

The skeleton of Individual 2 is better represented than that of Individual 1. Although less than 75% complete, it is well preserved. It belonged to a man 25 to 35 years old at death and 1.65 m (5′ 5″) tall. A pathological hole was observed in his right parietal bone. It was probably caused by a meningioma, which may not have produced any symptoms. Between three and five of his 18 recorded teeth had carious lesions. Three also showed signs of enamel hypoplasia, the result perhaps of late weaning. His postcranial skeleton displayed several modifications that may be activity-related. He also showed signs of incipient osteoarthritis. The cause of his death could not be established.

SHAFT GRAVE VI, INDIVIDUAL 1

This is the primary burial in Grave VI. The skeleton is 50% complete and moderately well preserved. Long bones are fragmentary and incomplete. Small bones are present and are listed below. The skull is less than 65% complete and 24 teeth are present in the maxilla or mandible.

FIG. 12. Individual 1. Extended skeleton.

FIG. 13. Individual 2. Extended skeleton.

Sex

The shape of the greater sciatic notch on each innominate bone suggests that this individual was male. The evidence of the cranium is equivocal. See below.

Age

His dental wear suggested an age at death of 20 to 25 years. The degree of closure of his coronal, sagittal, and lambdoid sutures supports this estimate.

Stature

Because of post-depositional damage to the articular ends of his long bones this individual's stature could not be determined.

Inventory and discussion of skeletal remains of Individual 1

Cranium (FIGS. 14–18). The *Vault* is confined to the frontal bone; much of each parietal; and a large part of the occipital. The right parietal is less complete than the left. The right and left temporals are confined to their mastoid and petrous parts.

The *Face* is confined to a damaged right zygomatic bone and almost complete maxillae.

The *Base* is confined to *c*.6 fragments of the basal part of the occipital and the sphenoid. The anterior condylar canal is single on the right and divided on the left.

Sutural closure. Metopic long since closed. Coronal, sagittal, and lambdoid sutures all patent, both internally and externally.

Cranial vault thickness. Thickness of right parietal at bregma *c*.6.0 mm. The condition of the cranial vault made it unwise to attempt wide-scale measurement.

Pathology and pseudopathology

1. Cribra orbitalia not present in roof of either right or left orbit. Thickened cranial diploë and increased trabeculation not present either. Bones of vault generally thin. There are changes to the outer surface of

FIG. 14. Cranium of Individual 1, frontal aspect.

FIG. 15. Cranium of Individual 1, vertical aspect.

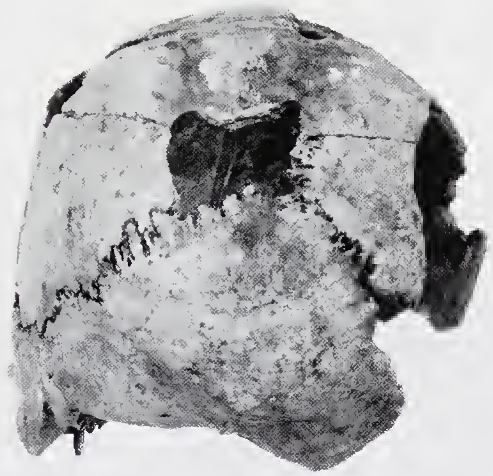


FIG. 16. Cranium of Individual 1, posterior aspect.

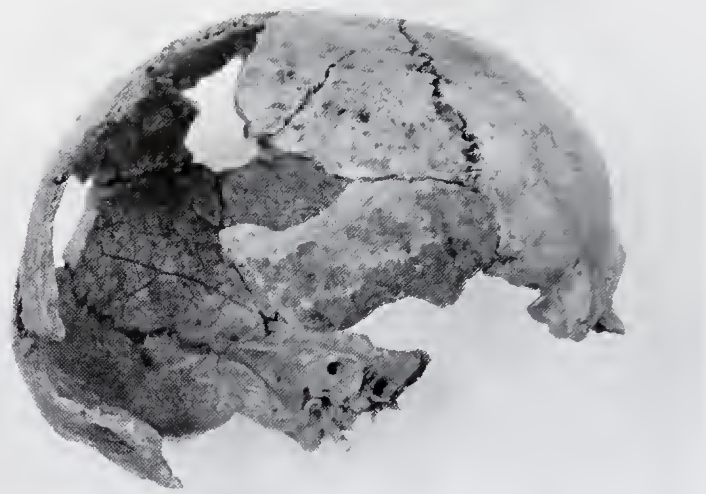


FIG. 17. Cranium of Individual 1, right lateral aspect.

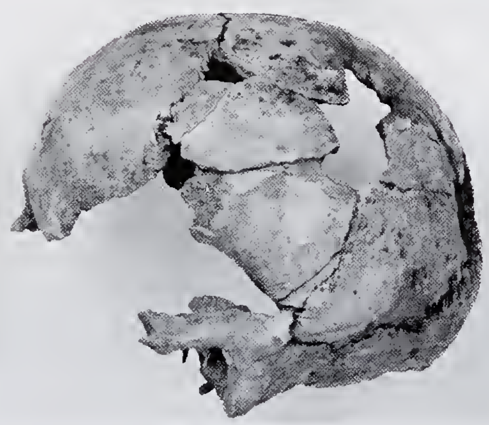


FIG. 18 (left). Cranium of Individual 1, left lateral aspect.

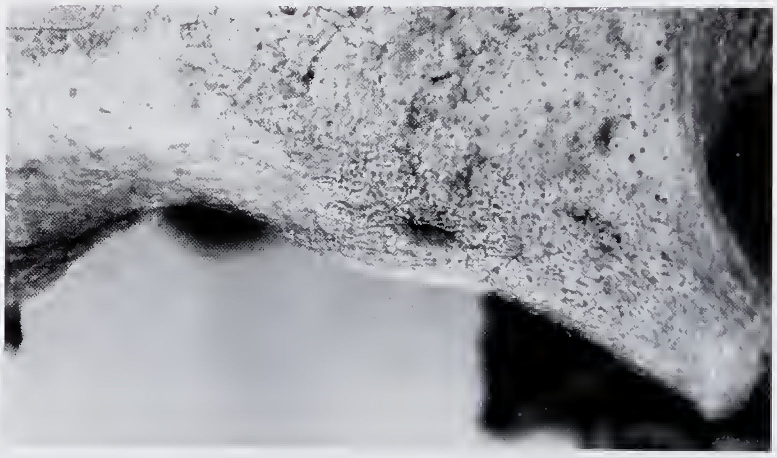


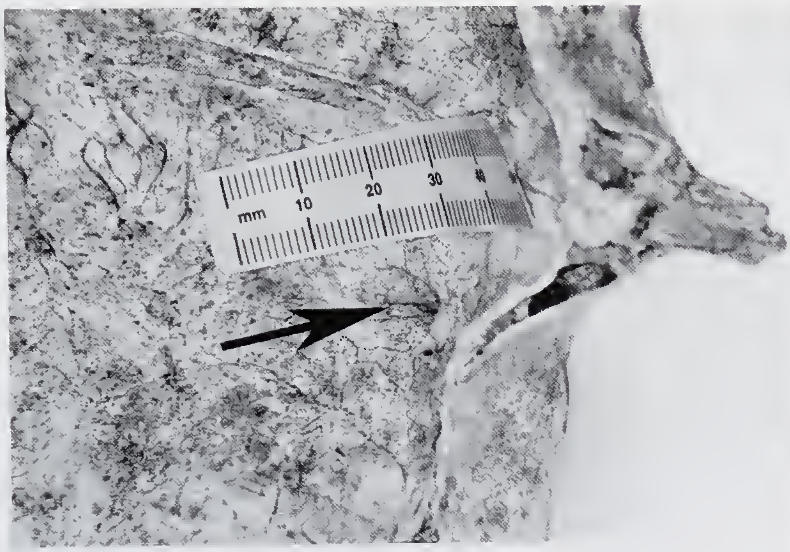
FIG. 19 (right). Cranium of Individual 1: traces of periosteal new bone on the supraorbital region of the left frontal bone.

the left frontal bone that are more attributable to periosteal new bone (PNB) than porotic hyperostosis (FIG. 19). 'I would refer to the abnormal area above the left orbit as PNB rather than porotic hyperostosis but it is not possible to be certain of the cause' (Waldron, pers. comm.).

2. The left frontal bone is perforated by an elongated hole with radiations on the outer surface (FIGS. 20–2). There appears to be some reorganisation on the inner surface. Aetiology at present unknown.
3. Extensive ramifications of meningeal vessels (FIG. 23). Aetiology at present unknown. 'I doubt that the pattern of the meningeal vessels is related either to the PNB or the frontal lesion.' (Waldron, pers. comm.).
4. On right frontal bone immediately above the orbital margin the surface is roughened by what look like a series of 'papillae' (FIG. 24). Probably post-depositional artefacts.

Sex

(*a*) Supraorbital region gracile.
(*b*) Glabella unremarkable.
(*c*) Superior rim of orbits neither sharp nor blunt, unlike the sharp rims of Skull 2.



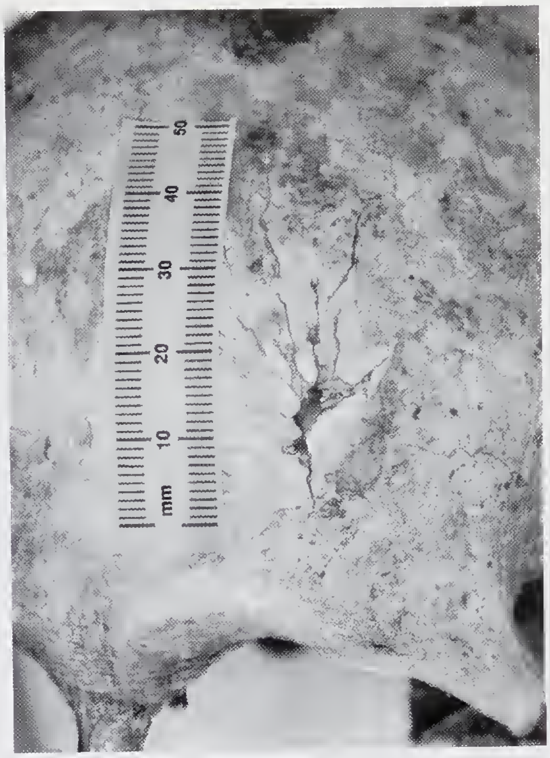


FIG. 20 (above). Cranium of Individual 1: endocranial surface of left frontal bone showing a perforation (arrowed) that extends externally.

FIG. 21 (right). Cranium of Individual 1: outer surface of left frontal bone showing radiations from the perforation.

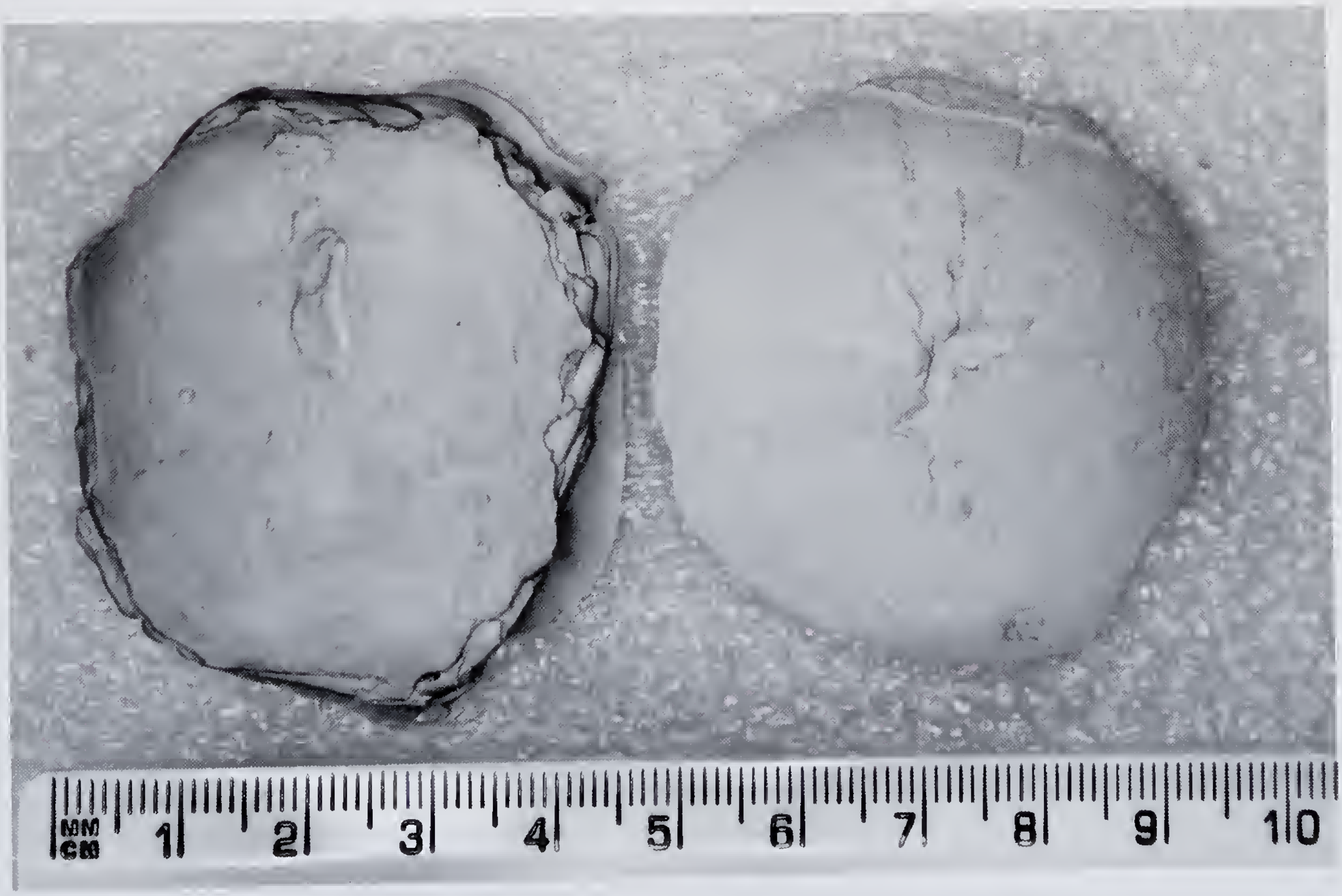
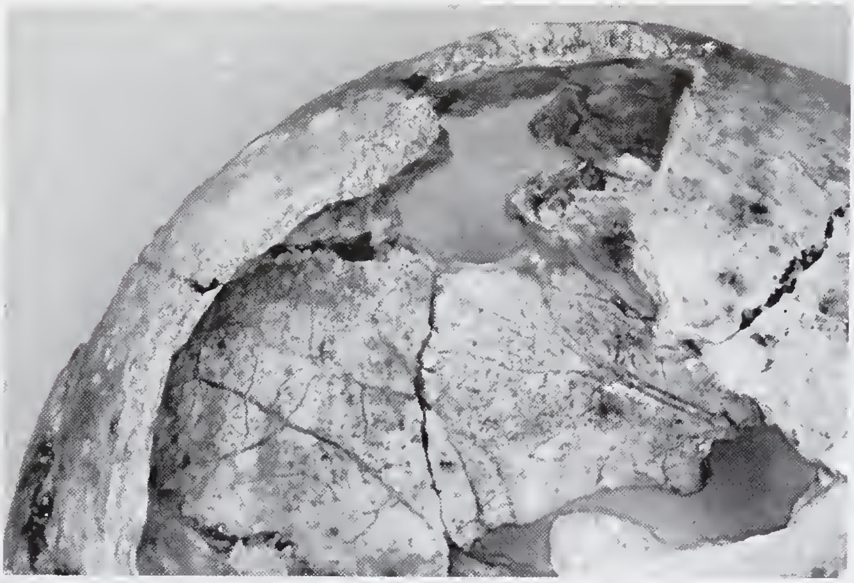


FIG. 22. Cranium of Individual 1: casts of perforation, endocranial surface on left, outer surface on right.



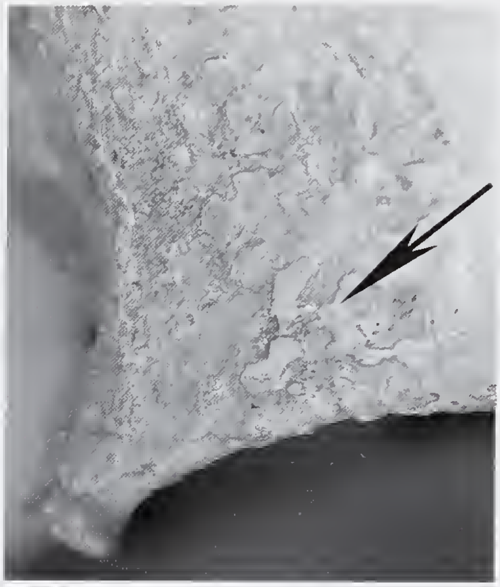


FIG. 23 (left). Cranium of Individual 1: impressions of meningeal vessels on left endocranial surface.
FIG. 24 (right). Cranium of Individual 1: roughened outer surface of right frontal bone (arrowed). Eroded after death?

(*d*) Mastoid processes unremarkable.
(*e*) External occipital protuberance present and not very marked but more so than Skull 2's.
(*f*) Gracile male?

Cranial metrics and non-metrics.

See TABLES 1 and 2. For a brief discussion of cranial and postcranial non-metric traits see Buikstra and Ubelaker (1994, 85–94).

Maxilla and mandible (FIGS. 25–8). The *maxilla* is incomplete. On the right side the palate is damaged and the frontal process is missing. However, a full complement of eight teeth is present. The left maxilla is better preserved. Part of the palate is missing but the frontal process is preserved. All of the upper teeth are generally in very good condition.

The *mandible* is less complete than the maxilla. Each ramus is damaged and both condyles and coronoid processes are missing. On the right side the mental foramen lies healthily midway between the alveolar margin and the lower border of the body below the bony septum between teeth 44 and 45. Charting the mandibular teeth accurately was difficult because of the presence of earlier consolidant, which may have obscured important features. For this reason calculus deposition was difficult to determine. The same applies to resorption, of which there seems to have been little. Enamel hypoplasia was not observed.

Dental pathology and other non-pathological observations.

For a dental chart see TABLES 3–4; for dental metrics and non-metrics TABLES 5–8; for comments on individual teeth see TABLES 9–10.

Caries. This individual had one small carious lesion on one of the 24 teeth recorded. It occurred distolingually on the occlusal surface of the crown of the mandibular left second molar (tooth 37). A second small potentially carious pit was observed on the occlusal surface of tooth 38.

Fractures and chips. Fractures were recorded on three teeth. Pieces of enamel were chipped off, revealing the underlying dentine. In all three cases, the fracture occurred on the buccal crown surface. Differentiating between ante-mortem and post-mortem dental fracture on an archaeological dry tooth can be difficult. One useful criterion however is the smoothing of the fractured edges of the tooth, which may take place in an ante-

TABLE 1. Individuals 1 and 2: cranial measurements (mm) (Howells 1973; Brothwell 1981).

No.	Name	Abbr.	Value	
			Individual 1	Individual 2
1	Glabello-occipital length	GOL	192	189
2	Nasio-occipital length	NOL	189	187
5	Maximum cranial breadth	XCB	?148	147
6	Maximum frontal breadth	XFB	?118	—
9	Biauricular breadth	AUB	—	127
11	Biasterionic breadth	ASB	—	123
24	Bifrontal breadth	FMB	97	—
39	Nasion-bregma chord	FRC	111	123
40	Nasion-bregma subtense	FRS	26	32
41	Nasion-subtense fraction	FRF	52	52
42	Bregma-lambda chord	PAC	138	124
43	Bregma-lambda subtense	PAS	32	25
44	Bregma-subtense fraction	PAF	64	66
I'	Minimum frontal breadth	B'	93	—

TABLE 2. Individuals 1 and 2: presence/absence of selected cranial non-metric traits.

Individual	Cranial Non-metrics									
	Metopic suture	Lambdoid ossicles		Ossicle at Lambda	Supra-orbital foramen complete		Frontal notch/ foramen		Maxillary bridging	
		L	R		L	R	L	R	L	R
1	0	0	—	0	1	0	1	1	1	1
2	0	0	—	0	1	0	0	1	1	1

Key: L left, R right, 1 present, 0 absent, — not recordable because the area is missing or damaged on the associated bone.

mortem fracture if sufficient time intervenes between the fracture and time of death of the individual (Ortner and Putschar 1981, 453). On two teeth—the maxillary right first premolar (tooth 14) and the mandibular left first molar (tooth 36)—the fractured edges appear to be smoothed, suggesting attrition of the enamel following the fracture and making it likely that the damage took place before the death of the individual. By contrast, the lesion on the crown of the maxillary left second molar (tooth 27) is larger than those on the other two and its sharp edges suggest that it could have occurred either ante- or post-mortem. Unfortunately these and other teeth had been coated with a glue or consolidant, perhaps by Angel, which made visual examination difficult, and prevented us from reaching a conclusion concerning the precise cause of these injuries. In modern populations, dental fractures commonly occur in road traffic accidents, contact sports, brawls, chewing on hard food, etc. They are also more frequent in men than women. Among the Mycenaeans from Grave Circle A they probably resulted from similar occupation-related and physical activities, and from their diet.

Misidentification. It should be noted that Angel misidentified the left maxillary and mandibular canines (teeth 23 and 33) and glued them into the incorrect alveoli. This error was confirmed by comparing them with the correctly identified right canine and the observation that the mandibular left canine does not fit well

FIGS. 25–8 (left to right). Individual 1: right side of maxilla, occlusal aspect; left side of maxilla, occlusal aspect; right side of mandible, occlusal aspect; left side of mandible, occlusal aspect.

TABLE 3. Dental chart of Individual 1. The teeth are numbered according to the Fédération Dentaire Internationale protocol, explained in TABLE 4. They are charted in a modified notation of that suggested by Brothwell (1981).

Upper Right															Upper Left
				cd										cd	
3	3	3	3	3	3	3	3	\	\	3	3	3	3	3	3
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
3	3	3	3	\	\	/	/	/	\	3	3	3	3	3	3
														|	|
													cd	C	C
															?
Lower Right															Lower Left

Symbol	*Meaning*
?	tooth and socket present
\	socket present but tooth missing
/	tooth and socket missing
C	carious lesion present on tooth
cd	chipped
|	break passes through socket for this tooth (between sockets for 37 and 38 in this quadrant)

into its socket on account of the length of its root. The teeth were left in the mandible/maxilla as they were reconstructed by Angel, but were recorded as identified by the authors.

Bushman canine. One rare dental non-metric trait observed on both right and left sides of the maxilla is the Bushman canine (FIG. 29; Hillson 2002, 88). It is named by Morris (1973) after the tribe of San Bushmen in

TABLE 4. Key to Fédération Dentaire Internationale tooth-side identification system. Each tooth—permanent and deciduous—is identified by two numbers. The first number indicates the quadrant it comes from; the second indicates the tooth. Thus 18 is the upper right permanent third molar; and 75 the lower left deciduous second molar. Further information on dental notation is easily available on many web sites on the Internet.

Quadrants Permanent	**Quadrant**	**Upper/lower/side**	**Teeth Permanent**	**No.**	**Tooth**
	1	Upper right		1	Central incisor
	2	Upper left		2	Lateral incisor
	3	Lower left		3	Canine
	4	Lower right		4	First premolar
Deciduous	**Quadrant**	Upper/lower/side		5	Second premolar
	5	Upper right		6	First molar
	6	Upper left		7	Second molar
	7	Lower left		8	Third molar ('wisdom tooth')
	8	Lower right			
			Deciduous	**No.**	**Tooth**
				1	Central incisor
				2	Lateral incisor
				3	Canine
				4	First molar
				5	Second molar

TABLE 5. Individual 1: dental measurements (maxillary), in mm (Nafplioti 2007), and other information.

	Bucco-lingual	**Mesio-distal**	**Wear Molnar 1971**	**Brothwell 1981**	**Lost PM**	**AM**
L side						
I 1st	—	—			X	
I 2nd	—	—			X	
C	8.85	8.00	3			
Pm3	9.00	6.60	2			
Pm4	9.55	6.90	3			
M1	11.80	10.80	3	3		
M2	—	10.00	2	3−		
M3	—	10.60	2	2+		
R side						
I 1st	7.30	8.55	3			
I 2nd	6.00	7.00	3			
C	8.60	7.60	3			
Pm3	8.55	6.50	2			
Pm4	9.45	6.60	2			
M1	11.80	11.20	3	3−		
M2	11.00	11.00	2	2 to 2+		
M3	9.75	12.90	2	1 to 2		

TABLE 6. Individual 1: dental measurements (mandibular), in mm (Nafplioti 2007), and other information.

	Bucco-lingual	Mesio-distal	Wear Molnar 1971	Brothwell 1981	Lost PM	AM
L side						
I 1st	—	—			X	
I 2nd	—	—			X	
C	—	—	3			
Pm3	—	—	3			
Pm4	—	—	2			
M1	10.75	11.40	3	3–		
M2	10.55	10.05	3	3–		
M3	10.50	12.40	3	2+		
R side						
I 1st	—	—				
I 2nd	—	—				
C	—	—			X	
Pm3	—	—			X	
Pm4	9.00	7.85	2			
M1	10.60	10.90	3	3–		
M2	10.60	10.55	2	3–		
M3	10.90	11.85	3	2 to 2+		

TABLE 7. Individuals 1 and 2: presence/absence of selected dental non-metric traits (maxillary teeth).

Individual	Shovelling I1		I2		CMAR		Bushman canine		Carabelli's cusp		Parastyle	
	L	R	L	R	L	R	L	R	L	R	L	R
1	—	—	—	—	1	1	1	1	1	1	0	0
2	—	—	—	—	0	—	0	—	1	1	0	0

Key: L left, R Right, 1 present, 0 absent, — not recordable because the area is missing or damaged on the associated tooth; CMAR = canine mesial accessory ridge.

TABLE 8. Individuals 1 and 2: presence/absence of selected dental non-metric traits (mandibular teeth).

Individual	Shovelling I1		I2		CMAR		Bushman canine		Protostylid	
	L	R	L	R	L	R	L	R	L	R
1	—	—	—	—	0	—	0	—	0	0
2	—	—	0	—	0	0	0	0	0	0

Key: L left, R Right, 1 present, 0 absent, — not recordable because the area is missing or damaged on the associated tooth; CMAR = canine mesial accessory ridge.

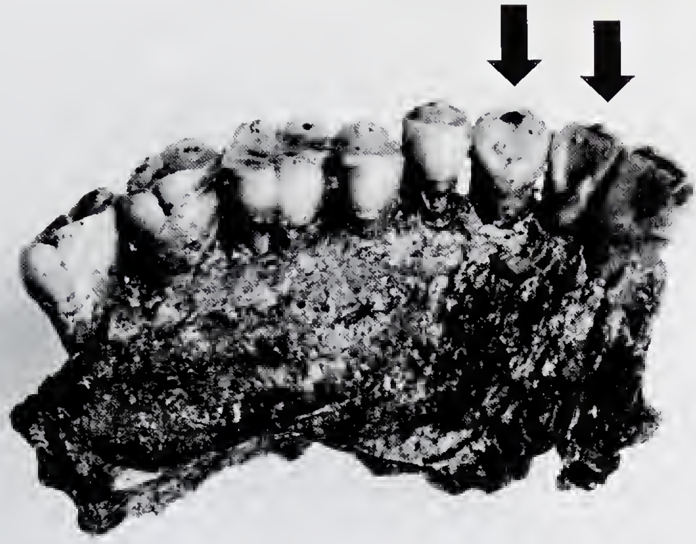


FIG. 29 (left). 'Bushman' canine and shovelling on the right maxillary lateral incisor of Individual 1.
FIG. 30 (right). Enthesophytosis of the supinator crest on the right and left ulnae of Individual 1.

TABLE 9. Comments on individual teeth of Individual 1.

Tooth	Comment
18	TASP; UW; WSBR 1 to 2.
17	TASP; VSW; WSBR 2 to 2+.
16	TASP; NVW; WSBR 3–; COC.
15	TASP; NVW.
14	TASP; NVW; quite large chip on buccal cusp and buccal surface of tooth.
13	TASP; socket damaged labially; tip worn; DE; a Bushman canine. See Hillson (2002, 88).
12	TASP; NVW; some DE on incisal surface; trace of shovelling.
11	TASP; NVW; DE on incisal surface; no shovelling.
21	TAB; TLAD; EHS.
22	TAB; TLAD; EHS.
23	TASP; SW; whole tooth splitting longitudinally. We agree that this is tooth 33. Did Angel transpose teeth 23 and 33? There is a large gap between these teeth, which does not exist in life because of the canine fossa on 24.
24	TASP; SW.
25	TASP; NVW; DE on palatal cusp.
26	TASP; WSBR 3; trace of a COC.
27	TASP; NVW; WSBR 3–; large chip mesiobuccally.
28	TASP; slightly more worn than right; WSBR 2+.
38	TASP; NVW; WSBR 2+; a large tooth with wrinkled enamel; small potentially carious pit on OS. A break passes between sockets for 38 and 37.
37	TASP; WSBR 3–; small carious pit distolingually on OS.
36	TASP; WSBR 3–; distobuccal cusp worn: DE or chipped?
35	TASP; SW; slightly rotated clockwise. Is this an artefact of Angel's examination and repair? Neck of tooth and adjacent alveolus obscured by earlier consolidant.
34	TASP; SW; v. slight DE on tip.

TABLE 9. Continued.

Tooth	Comment
33	TASP; DE on tip. We agree that this is tooth 23. Did Angel transpose teeth 33 and 23?
32	TAB; TLAD; EHS.
31	TASM.
41	TASM.
42	TASM.
43	TAB; TLAD; EHS.
44	TAB; TLAD; EHS.
45	TASP; NVW.
46	TASP; VSW; WSBR 3–.
47	TASP; VSW; WSBR 3–.
48	TASP; SW; WSBR 2 to 2+; a large tooth with wrinkled enamel.

Africa, where this is most frequent. On the Bushman canine, the mesial marginal ridge on the lingual tooth crown surface is thicker than the distal one. It is particularly prominent and has an additional buttress that runs down the crown and merges with the tuberculum dentale. This can occur on both maxillary and mandibular canines, but is more common on the former.

Incisor shovelling. Incisor shovelling of the crown was scored on the maxillary right second (lateral) incisor. It occurs when the mesial and distal marginal ridges are particularly prominent and enclose a relatively deep fossa on the lingual surface of the crown (Turner *et al.* 1991).

Carabelli's cusp. This was recorded on both right and left maxillary first molars, as on teeth 16 and 26 of Individual 2. It is found most frequently on the palatal side of the mesio-palatal cusp of the crown of the maxillary first molars. It is a non-metric dental morphological trait (Turner *et al.* 1991). The presence/absence of such traits is not pathological and the frequency of their occurrence within a population has been demonstrated to convey information on its genetic make up (Tyrell and Chamberlain 1998).

Hyoid bone. Not seen.

TABLE 10. Dental abbreviations and contractions.

CA	congenitally absent
COC	cusp of Carabelli
DE	dentine exposed/exposure
EDHS	empty damaged healthy socket
EH	enamel hypoplasia
EHS	empty healthy socket
GC	good condition
NVW	not very worn
OS	occlusal surface
QGC	quite good condition
QW	quite worn
SW	scarcely worn
TAB	tooth absent
TASM	tooth and socket missing
TASP	tooth and socket present
TLAD	tooth lost after death
UW	unworn
VGC	very good condition
VSW	very slightly worn
WSBR	wear stage (Brothwell)

Postcranial remains of Individual 1

See TABLE 11, and for postcranial non-metrics TABLE 12.

Pathological and non-pathological skeletal modifications

Although these two individuals were almost certainly members of a powerful ruling family or clan, they lived in a pre-literate age and left behind no record of their everyday lives. We do not know how many hours each day/year they spent in the saddle, driving chariots, hurling spears, brandishing swords, drawing bows, running

TABLE 11. Postcranial remains of Individual 1 (Primary Burial).

Skeletal element	Completeness (%)					
Left clavicle	60%, 2 fragments					
Left scapula	15%, 1 fragment					
	No. of fragments	Proximal epiphysis	Diaphysis by thirds proximal	middle	distal	Distal epiphysis
Left humerus	3	50%	0%	0%	85%	90%
Left radius	0	0%	0%	0%	0%	0%
Left ulna	1	100%	100%	90%	0%	0%
Left femur	4	0%	0%	40%	40%	50%
Left tibia	3	0%	40%	100%	90%	80%
Left fibula	0	0%	0%	0%	0%	0%
Left innominate	30%, 6 fragments					
Left hand						
carpals	0					
metacarpals	1st (60%), 3rd (50%), 5th (30%) and one distal end (head) of probably the 2nd metacarpal (15%)					
phalanges	0					
Left foot						
tarsals	talus (85%), navicular (80%)					
metatarsals	1st metatarsal (<10%)					
phalanges	0					
Right clavicle	0					
Right scapula	50%, 2 fragments					
	No. of fragments	Proximal epiphysis	Diaphysis by thirds proximal	middle	distal	Distal epiphysis
Right humerus	1	0%	100%	100%	100%	0%
Right radius	2	0%	95%	100%	10%	100%
Right ulna	2	100%	80%	0%	50%	50%
Right femur	2	0%	10–15%	10–15%	0%	0%
Right tibia	2	0%	85%	100%	90%	95%
Right fibula	3	0%	40%	40%	30%	<10%
Right innominate	35%, 6 fragments					
Right hand						
carpals	0					
metacarpals	2nd (100%), 3rd (70%), 4th (100%)					
phalanges	1 proximal phalanx, unsided					
Right foot						
tarsals	calcaneus (75%), talus (95%), cuboid (80%)					
metatarsals	0					
phalanges	0					
Sternum	15%, 1 fragment					
Vertebrae	Cervical: 4 bodies and 1 neural arch	Thoracic: 5 bodies and 7 neural arches	Lumbar: 5 arches			
Sacrum	1st sacral vertebra (<10%)					
Left ribs	2 proximal ends (head) and 3 shaft fragments					
Right ribs	1 proximal end (head) and 4 shaft fragments					

TABLE 12. Individuals 1 and 2: presence/absence of selected post-cranial non-metric traits.

Individual	**Post-cranial non-metrics**											
	Septal aperture (humerus)		**Poirier's facet (femur)**		**Plaque formation (femur)**		**Medial squatting facet (tibia)**		**Lateral Squatting facet (tibia)**		**Medial talar facet (talus)**	
	L	R	L	R	L	R	L	R	L	R	L	R
1	1	–	–	–	–	–	–	–	1	1	–	–
2	0	–	–	–	1	–	0	–	1	1	–	–

Key: L left, R right, 1 present, 0 absent, — not recordable because the area is missing or damaged on the associated bone.

over rough terrain, wrestling, boxing or engaged in other physical activities. Moreover not every member of any supposedly elite and martial family necessarily conformed to the image. From time to time it is possible that a more introverted son appeared, who might have been more interested in caring for the fabric of the palace, supervising building projects, and overseeing civil and religious ceremony than on military expeditions and adventures near or far.

For this reason we have resisted the temptation to draw any rash conclusions about the possible effects of physical activity, lifestyle, and any other occupational stresses on their skeletal remains. However, where there are signs of change that in the literature are normally associated with these causative agents, we have noted them accordingly but without drawing conclusions as to the physical activity or specific occupations involved. Our approach is in line with the guidance offered by Waldron (2007, 117–27).

A modest bony tubercle on the interosseous crest immediately distal to the radial notch on the proximal shaft of each ulna suggested enthesophytosis of the supinator crest (FIG. 30).[2] This is where part of the supinator muscle arises from the ulna and hypertrophic development here may be activity-related. According to Mann and Murphy (1990, 91) it may reflect high mechanical stress on the arms and is a morphological feature commonly found in populations that use their arms in strenuous activities. The bony tubercle is slightly more pronounced on the right than the left ulna.

The morphology of the antero-medial half of the left clavicle is modified in the same way as that of Individual 2. The squaring-off of the clavicular shaft is interpreted as activity-related (see the section on Individual 2 below). Mechanical stress may also account for moderate enthesophytosis of the popliteal line on the posterior surface of the proximal shaft of each tibia.

There are no pathological modifications on any of the articular surfaces recorded, as would be expected for a young adult.

SHAFT GRAVE VI, INDIVIDUAL 2

This is the secondary burial in Grave VI. The skeleton is less than 75% complete and well preserved. The proximal and distal ends of most of the long bones are damaged or missing. The skull is 85% complete and eighteen teeth are present in the maxilla or mandible.

Sex

On the evidence of the morphology of the nuchal crest, glabella region, and supraorbital ridges this individual was probably male. The mastoid processes, although less robust than those of Individual 1 also appear to be

[2] Enthesophytosis is the hypertrophic development of osteophytes at the sites of muscle insertion on bones. It is associated with repeated trauma to tendons induced by muscular exertion, or in some cases with disease (Mann and Murphy 1990, 91; Rogers and Waldron 1995, 24).

male. Four postcranial measurements were taken, which, when compared with published data on sex determination, yielded equivocal results. See TABLES 13–16.[3]

Age

His dental wear suggested an age at death of no more than 35 years. The degree of closure of his coronal, sagittal, and lambdoid sutures supports this estimate.

TABLE 13. Individual 2. Post-cranial measurements, in mm (Buikstra and Ubelaker 1994).

Skeletal element	**Side**	**Measurement**	**Value**
Clavicle	Left	Length	?140.0
Humerus	Right	Vertical diameter of head	43·7
Humerus	Left	Epicondylar breadth	56.0
Femur	Left	Maximum length	435·0
Femur	Left	Maximum diameter of head (damaged)	43·6
Tibia	Right	Maximum length	346.0

TABLE 14. Individual 2. Sex determination of the clavicle from its length. Authorities consulted for comparative data: Parsons (1916), Terry (1932), Olivier (1951; cited by Genovés 1969), Singh (1972), Kaur *et al.* (2002).

Individual 2	**Side**	**Value**	**Sex**
Clavicle length	Left	?140.0	Male?

TABLE 15. Individual 2. Sex determination of the humerus. Authorities consulted for comparative data: Dwight (1905), Parsons (cited by Harrison 1953, 88), Pearson (cited by Harrison 1953, 88), Thieme and Schull (1957), Stewart (1979).

Individual 2	**Side**	**Value**	**Sex**
Vertical diameter of head	Right	43·7	Male?
Epicondylar breadth	Left	56.0	Female?

TABLE 16. Individual 2. Sex determination of the femur from the maximum diameter of its head. Authorities consulted for comparative data: Dwight (1904–5), Parsons (1914; 1915), Holtby (1918), Pearson and Bell (1919), Thieme and Schull (1957), Van Gerven (1972), Stewart (1979, 120).

Individual 2	**Side**	**Value**	**Sex**
Femur: Maximum diameter of head	Left	43·6	Female/Male?

[3] The length of the left clavicle, the vertical diameter of the right humeral head, the epicondylar breadth of the left humerus, and the maximum diameter of the left femoral head.

Stature

The following scores for Individual 2's stature were determined from regression equations in Trotter (1970).

1. From the maximum length of his left femur (43.5 cm): = 2.38 x 43.5 + 61.41 ±3.27 cm = 164.94 ±3.27 cm = [x 0.3937] 64.94″ = 5′5″ ±1¼″.
2. From the maximum length of his right tibia (34.6 cm): = 2.52 x 34.6 + 78.62 ±3.37 cm = 165.81 ±3.37 cm = [x 0.3937] 65.28″ = 5′5¼″ ±1¼″.

Inventory and discussion of skeletal remains of Individual 2

Cranium (FIGS. 31–4). Much of the vault is preserved intact. Frontal almost complete. Right frontomalare damaged. Small area also missing along right coronal suture. Right parietal well represented. Several pieces missing posteriorly. Left parietal complete except for a small portion 35 mm above suture with temporal bone. Occipital bone less well represented. Of the temporal bones, the right mastoid and petrous parts are intact; the left lacks only part of its zygomatic process.

Face. Much of right and left maxillae preserved. Zygomatic and nasal bones missing.

Base. Missing.

Sutural closure. Metopic long since closed. Coronal not quite closed internally; closed externally. Sagittal obliterated internally; closed externally but line of suture visible. Lambdoid obliterated internally; closed externally but line of suture visible.

Cranial vault thickness. The bones look generally thin. Because of their fragmentary condition no direct measurements were taken.

Pathology

1. Very faint trace of cribra orbitalia present in roof of both right and left orbits (FIG. 35); but thickened cranial diplöe and increased trabeculation not present on vault. Bones of vault generally thin. Cribra

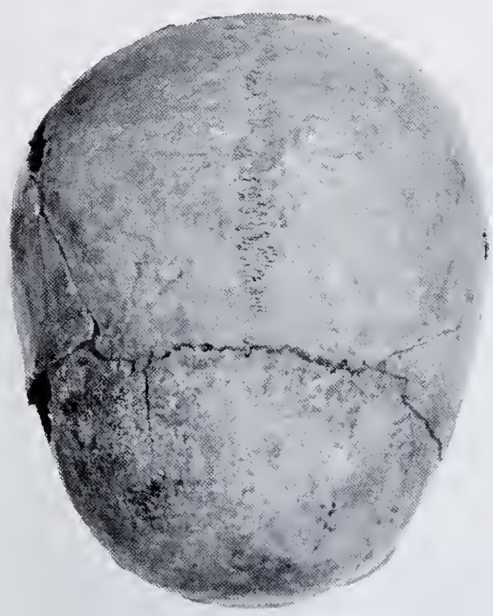


FIG. 31 (left). Cranium of Individual 2, vertical aspect.
FIG. 32 (right). Cranium of Individual 2, posterior aspect.

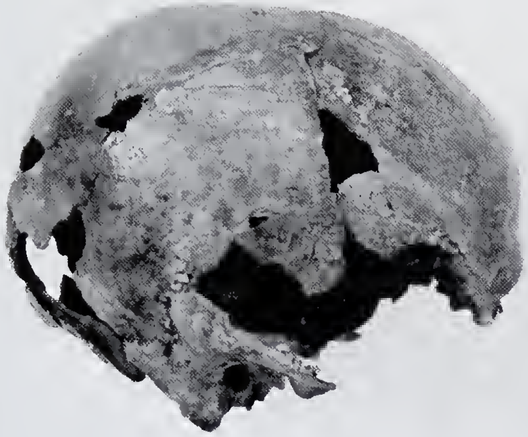


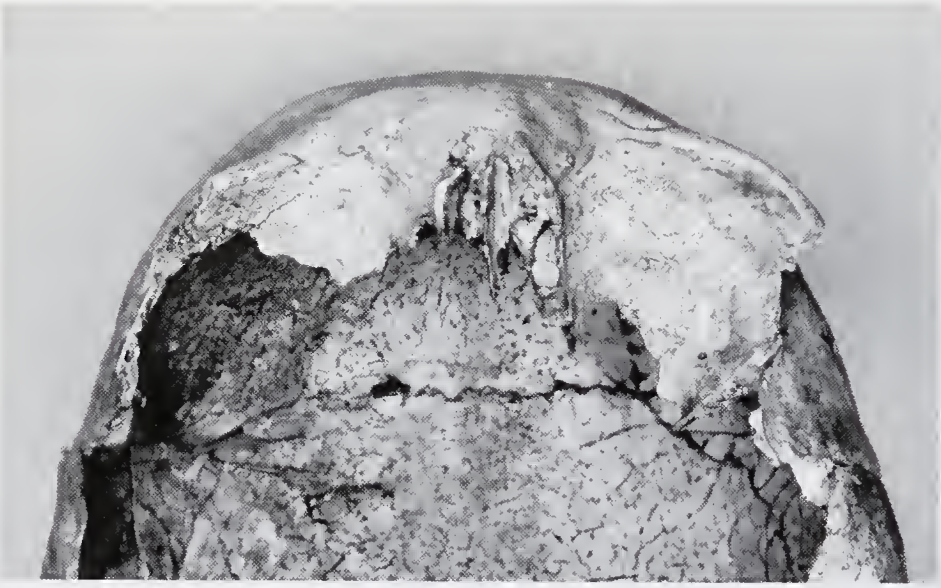
FIG. 33 (left). Cranium of Individual 2, right lateral aspect.
FIG. 34 (right). Cranium of Individual 2, left lateral aspect.

orbitalia is a common finding in individuals who suffered from anaemias (Stuart-Macadam 1989). Although it is difficult to differentiate between the various types of anaemias that may be causing cribra orbitalia, it most probably reflects thalassaemia or iron-deficiency anaemia. Angel (1964; 1966) interpreted the presence of porotic hyperostosis in prehistoric crania from Greece as evidence of thalassaemia in antiquity. This interpretation is substantiated by the frequency of alpha and beta thalassaemia in the modern Greek indigenous populations (Rucknagel 1966). On the other hand, regarding iron-deficiency anaemia it would not be an unrealistic assumption that at least some of the factors implicated in this condition, such as nutrional deficiencies, blood loss, parasitic infections, and/or chronic diarrhoea were part of this individual's life (Ubelaker 1992). 'The pitting on the orbital roof would certainly be referred to as cribra but it is of very minor proportions and certainly not very significant.' (Waldron, pers. comm.).

2. Hole present in right parietal 20.0 mm from sagittal suture and 20.0 mm from coronal suture (FIGS. 36–8). External diameter 6.0 mm. Measurement of internal diameter not attempted. Very likely to have been a meningioma. Bears a close resemblance to Case 2 in Waldron (1998). See too Campillo (1991). 'Meningiomas may give rise to a number of symptoms, depending on whereabouts they arise. Generally speaking, the symptoms will depend on which area of the brain is compressed. Thus a tumour which compresses the motor area would cause upper motor neurone symptoms while one over the sensory area would produce loss of sensation in the area supplied by that part of the sensorium. If the tumour is very large it will produce symptoms of raised intra-cranial pressure which would include headaches, perhaps vomiting made worse by coughing or straining at stool, and in extremis, loss of consciousness and death because of coning of the medulla. Given that the tumour in [Individual 2's cranium] ... eroded outwards, it is most likely that it produced no symptoms; these tumours are generally slow growing and the pressure defect is likely to have developed over many months and produced no untoward symptoms' (Waldron, pers. comm.).
3. The inner surface of the cranial vault bears many vascular impressions and has a craquelure appearance (FIG. 39). 'Meningiomas account for ~15–20% of all primary intra-cranial tumours [and] are the commonest cause of pathological vascular markings on the skull ...' (Waldron 1998, 213).

Sex

(*a*) Supraorbital region generally gracile.
(*b*) Glabella not particularly marked.
(*c*) Mastoid processes on small side.



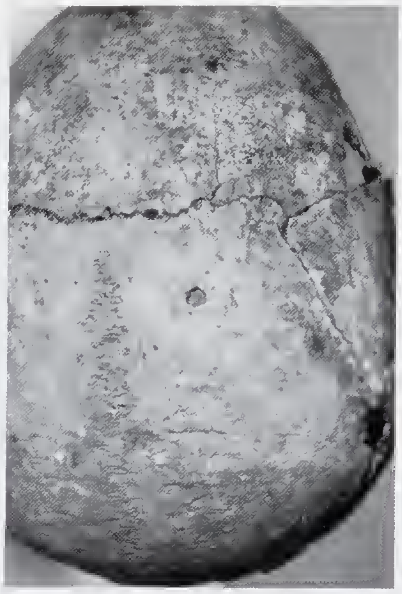
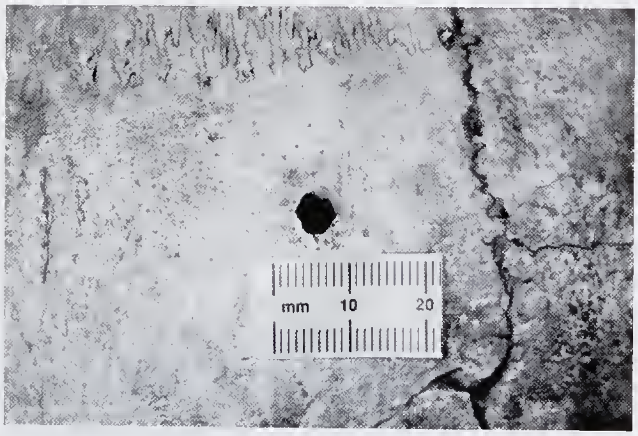


FIG. 35 (left). Cranium of Individual 2: orbital roofs showing slight trace of cribra orbitalia.
FIG. 36 (right). Cranium of Individual 2: superior aspect of outer surface showing hole in right parietal.



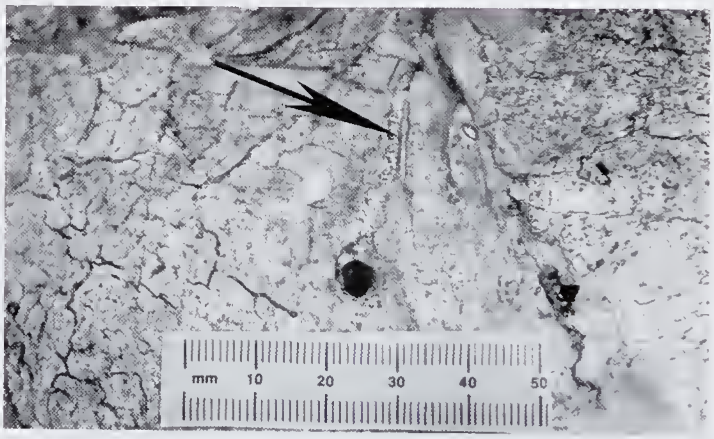


FIG. 37 (left). Cranium of Individual 2: outer surface of right parietal showing hole.
FIG. 38 (right). Cranium of Individual 2: endocranial surface of right parietal showing: hole; channel (arrowed) for large aberrant vessel carrying blood supply to suggested meningioma; and craquelure appearance.

(*d*) External occipital protuberance not well marked.
(*e*) Gracile male, on evidence of cranial morphology (and four postcranial measurements; see TABLES 13–16).

Cranial metrics and non-metrics

See TABLES 1 and 2.

Maxilla and mandible (FIGS. 40–2). The *maxilla* is virtually complete. The *mandible* is in two halves. A fracture line runs inferiorly and distally through the sockets of the central incisors (teeth 31 and 41) and ends at the level of the space between the left canine and left first premolar (teeth 33 and 34). This makes it difficult to determine the chin profile. It looks more parabolic than squared off.

FIG. 39. Cranium of Individual 2: vascular impressions, craquelure appearance, and hole in right parietal (arrowed) on endocranial surface.

FIGS. 40–2 (left to right) Individual 2: right and left sides of maxilla, occlusal aspect; right side of mandible, and part of left near midline, occlusal aspect; left side of mandible, damaged, occlusal aspect.

The right half of the mandible is less well preserved than the left. It comprises a large portion of the body with its inferior border damaged from the level of the second premolar (tooth 45) to the angle of the jaw. The ramus is missing.

The left side is almost complete. There is some damage on the buccal surface of the body and to the inferior border between the second premolar and second molar (teeth 35 and 37).

On the right the mental foramen lies midway between the alveolar margin and the inferior border of the body below the bony septum between the first and second premolars (teeth 44 and 45).

Gonial eversion can be determined on the left where it is slight. The impressions for both the masseter and medial pterygoid muscles are reasonably marked.

Dental pathology and other non-pathological observations

For a dental chart see TABLE 17; for dental metrics and non-metrics see TABLES 7–8, 18–19; for comments on individual teeth see TABLES 10 and 20.

TABLE 17. Dental chart of Individual 2. The teeth are numbered according to the Fédération Dentaire Internationale protocol, explained in TABLE 4. They are charted in a modified notation of that suggested by Brothwell (1981).

<table>
<tr><td colspan="8">Upper Right</td><td colspan="8">Upper Left</td></tr>
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<table>
<tr><th>Symbol</th><th>Meaning</th></tr>
<tr><td>3</td><td>tooth and socket present</td></tr>
<tr><td>\</td><td>socket present but tooth missing</td></tr>
<tr><td>(?)</td><td>tooth not erupted; congenitally absent?</td></tr>
<tr><td>CA</td><td>congenitally absent</td></tr>
<tr><td>C</td><td>carious lesion present on tooth</td></tr>
<tr><td>EH</td><td>enamel hypoplasia observed</td></tr>
<tr><td>|</td><td>break passes through socket for this tooth (tooth 41 in this quadrant)</td></tr>
</table>

TABLE 18. Individual 2: dental measurements (maxillary), in mm (Nafplioti 2007), and other information.

	Bucco-lingual	**Mesio-distal**	**Wear Molnar 1971**	**Brothwell 1981**	**Lost PM**	**AM**
L side						
I 1st	—	—			X	
I 2nd	—	—			X	
C	9.20	8.20	3			
Pm3	10.00	7.00	3			
Pm4	9.20	6.40	3			
M1	12.00	11.20	3	2+ to 3−		
M2	12.50	11.10	2	2+		
M3	—	—	—	—	X	
R side						
I 1st	—	—			X	
I 2nd	—	—			X	
C	—	—			X	
Pm3	9.50	7.70	3			
Pm4	9.50	6.85	2			
M1	12.20	11.60	3	3−		
M2	12.50	10.85	2	2 to 2+		
M3	—	—	—	—	X	

TABLE 19. Individual 2: dental measurements (mandibular), in mm (Nafplioti 2007), and other information.

	Bucco-lingual	Mesio-distal	Wear Molnar 1971	Brothwell 1981	Lost PM	AM
L side						
I 1st	—	—			X	
I 2nd	6.65	6.00				
C	8.20	7.00	3			
Pm3	8.25	7.70	3			
Pm4	8.80	7.65	2			
M1	11.50	11.50	4	3		
M2	11.00	11.20	3	2+ to 3−		
M3	—	—	—	—	CA	
R side						
I 1st	—	—			X	
I 2nd	—	—			X	
C	8.50	7.00	3			
Pm3	—	—			X	
Pm4	—	—			X	
M1	11.60	11.85	3	3		
M2	11.15	11.35	2	3−		
M3	—	—	—	—	CA	

Caries. This individual had carious lesions in three of the eighteen teeth present (teeth 26, 37, and 47). All occurred on the occlusal surface of the crown and are relatively small. The largest is on the left maxillary first molar (tooth 26). Two more potential lesions were observed on the occlusal surface of teeth 27 and 46.

Enamel hypoplasia. Dental enamel hypoplastic lines reflect disturbances in enamel development (amelogenesis). This begins at the occlusal surface of each tooth crown and is directed towards the root ending at the cemento-enamel (crown-root) junction. Dietary, disease or other forms of stress experienced by an individual during amelogenesis may temporarily disturb the ameloblastic activity. These disturbances are manifested on the tooth crown by enamel hypoplastic defects that can take various forms, i.e. lines, pits and grooves (Ortner 2003, 595). The actual position of the lines on the crown and data on dental development (Smith 1991) may be used to extrapolate the age at which the respective individual experienced some form(s) of stress.

Four marked hypoplastic lines were recorded on the buccal (anterior) surface of both right and left mandibular canines (teeth 33 and 43; FIG. 43). Despite light attrition of the enamel and the consequent reduction of the crown height, the earliest line occurs slightly higher than halfway up the crown and the last one, very close to the cemento-enamel junction. Two less well-defined hypoplastic lines were recorded close to the cemento-enamel junction on the buccal surface of the left mandibular second (lateral) incisor (tooth 32).

The present data suggests that Individual 2 probably experienced stress at least in the period between the age of 2½ and 4 years. It is possible, but by no means certain, that this is a sign of late weaning.

Calculus. Slight calculus (Brothwell 1981, 155) was recorded on all eighteen teeth examined. It was deposited on the enamel at the cemento-enamel junction and runs intermittently around the circumference of the tooth crown.

Carabelli's cusp. This additional cusp was scored on both the right and left maxillary first molars of this individual.

Resorption. Slight to medium.

Hyoid bone. Not seen.

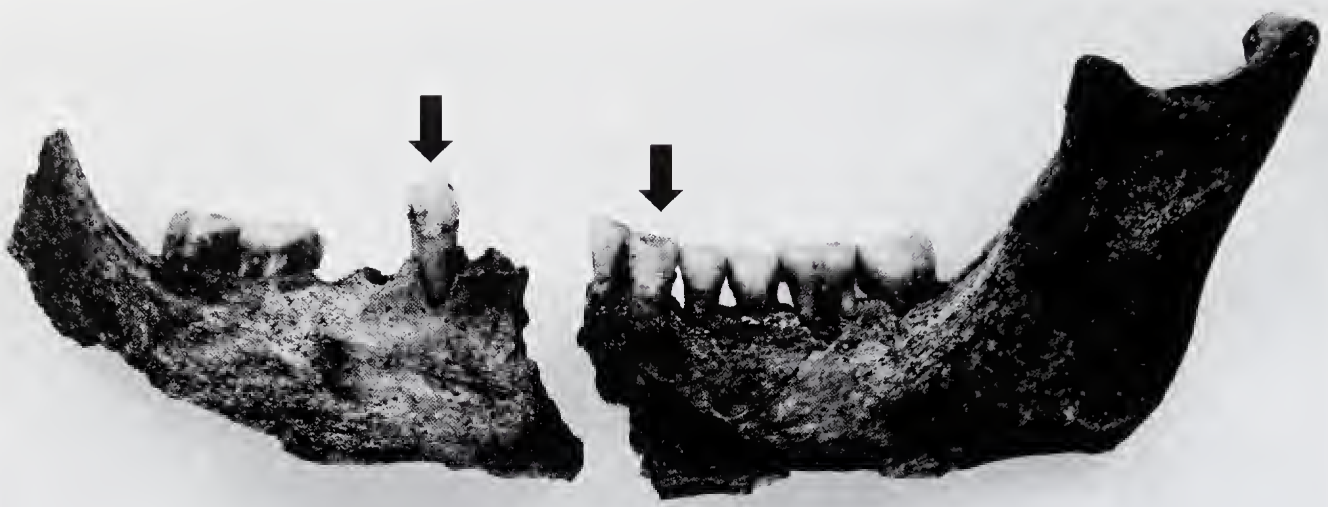


FIG. 43. Dental enamel hypoplasia on the right and left mandibular canines of Individual 2.

Postcranial remains of Individual 2

See TABLE 21, and for postcranial metrics and non-metrics TABLES 12–13.

Pathological and non-pathological skeletal modifications

Osteophytes are present on one quarter of the rim of the glenoid fossa of the right scapula inferiorly. They are not large; and the articular surface is not pathological. Moreover, no associated changes were observed on the remaining superior half of the head of the right humerus. Although osteophytes are common in osteoarthritis, the absence of other associated skeletal changes on the glenoid fossa, such as eburnation, new bone formation, pitting of the articular surface, or deformation of the joint, suggests that these marginal osteophytes were neither osteoarthritic nor pathological (Rogers and Waldron 1995, 25–6). Irregular outgrowths of new bone were also recorded supero-anteriorly on the lateral end of the right clavicle where it articulates with the scapula. Part of the deltoid muscle arises here.

Slight enthesophytosis was recorded on the deltoid tuberosity of the right humerus. It is the site of insertion of the deltoid muscle on to the humerus, from its extensive origin on the clavicle, the acromion and the spine of the scapula (White and Folkens 2000, 184). It is a major abductor of the arm (ibid. 184).

Enthesophytes were also observed on the conoid tubercle and the infero-posterior and antero-medial surfaces of the right clavicle, the origin of pectoralis major. The latter led to the 'squaring-off' of the anterior portion of the midshaft of the bone, which was also roughened by the deposition of irregular bony outgrowths (FIG. 44). Analogous modifications were recorded on the left clavicle. In Capasso *et al.* (1999, 39) this lesion is associated with generalized stress of the pectoral girdle, particularly with forward bending of the body while moving heavy loads or with hanging them from the shoulders, hunting, or other rigorous working conditions.

Osteophytes were observed anteriorly on the rim of the acetabulum on the right innominate bone. Lipping on the portion of the rim present (75% of the total) is slight and intermittent. In the absence of any other osseous changes to the right hip-joint, osteoarthritis cannot be diagnosed. No pathological signs were recorded on the preserved portion (20%) of the rim of the left side acetabulum.

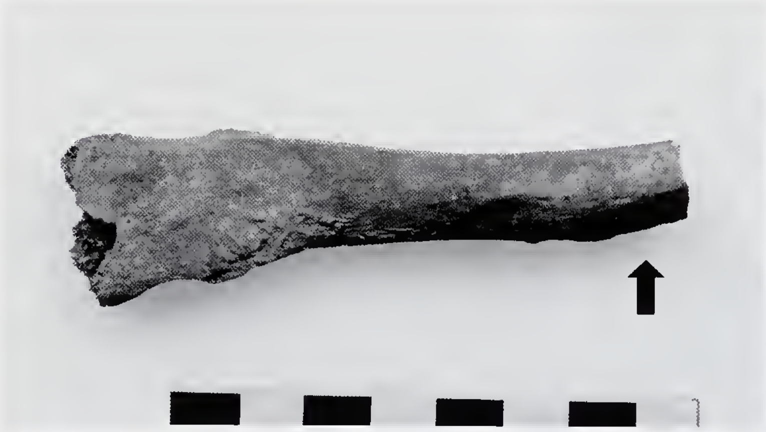
On the posterior surface of the left femur at the midshaft irregular outgrowths of reactive new bone

TABLE 20. Comments on individual teeth of Individual 2.

Tooth	Comment
18	TAB; TLAD; EDHS. From appearance of the socket, the roots were not complete. Had the tooth recently erupted?
17	TASP; GC; NVW; WSBR 2 to 2+.
16	TASP; GC; NVW; WSBR 3–. Trace of a COC.
15	TASP; VGC; SW on enamel only. No DE.
14	TASP; VGC; SW; less worn than 15. No DE.
13	TAB; TLAD; EHS.
12	TAB; TLAD; EHS.
11	TAB; TLAD; EHS.
21	TAB; TLAD; EHS.
22	TAB; TLAD; EHS.
23	TASP; slight wear visible on enamel of OS. Trace of DE on tip. Socket damaged labially.
24	TASP; GC; similar to 14, but slightly more worn; DE on buccal cusp.
25	TASP; GC; similar to 15, but slightly more worn; DE on buccal cusp.
26	TASP; QGC; WSBR 2+ to 3–. There is quite a large hole, with smooth edges, on the palatal half of the OS. Chipped? Carious? Non-carious DE. Faint trace of a COC.
27	TASP; GC; NVW; WSBR 2+ on enamel only. Small pit present on OS which may be carious.
28	TAB; TLAD; EHS. See 18. From appearance of the socket, the roots were not complete. Had the tooth recently erupted?
38	TAB; CA?
37	TASP; GC; enamel worn; WSBR 2+ to 3–. Small pit on OS distolingually; carious?
36	TASP; GC; enamel QW; WSBR 3.
35	TASP; VGC; wear visible buccally.
34	TASP; enamel slightly worn; faint trace of DE on buccal cusp.
33	TASP; GC; tip worn; trace of DE; EH visible labially.
32	TASP; GC; incisal surface worn; EH visible labially.
31	TAB; TLAD; EDHS.
41	TAB; TLAD; EDHS. A break passes through the socket for this tooth.
42	TAB; TLAD; EHS.
43	TASP; EH near tip.
44	TAB; TLAD; EHS.
45	TAB; TLAD; EHS.
46	TASP; GC; WSBR 3. Pit present mesiobuccally on OS; carious?
47	TASP; GC; WSBR 3–. Small pit on OS centrodistally; carious?
48	TAB; CA.

abounded. They originated on the medial border of the linea aspera and run downwards on the shaft for 48 mm. The linea aspera is the site of attachment of vastus medialis, vastus lateralis, and adductors longis, brevis, and magnus. The last are adductors of the hip (White and Folkens 2000, 236). Excessive pulling stresses on the linea aspera during the performance of physical activities involving the lower limbs have been suggested as a cause by Capasso *et al.* (1999, 103–4).

New bone formation was recorded on two more sites on the posterior surface of the distal shaft of the left femur. The larger (31 mm × 8 mm) is on the area of the lateral supracondylar line; the smaller (15 nmm × 3 mm) on the area of the medial. They may reflect an inflammatory response of the periosteum—periostitis—to a non-specific infection or direct trauma (Ortner and Putschar 1981, 132; White and Folkens 2000, 392). However there are many other conditions that result in the periosteum laying down new bone—among them



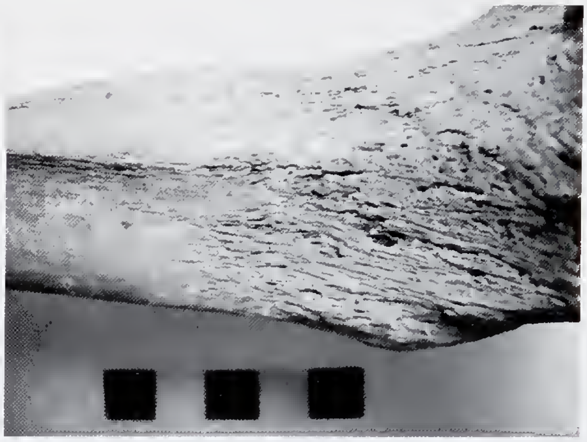


FIG. 44 (left). Squaring-off of the anterior portion of the midshaft of the right clavicle of Individual 2.
FIG. 45 (right). Periostitis on the proximal shaft of the right tibia of Individual 2.

burning, hyperaemia, malignant disease and some metabolic conditions—in addition to infection and trauma (Waldron, pers. comm.)

Roughening of the gluteal line by the development of small enthesophytes was recorded postero-laterally on the proximal shaft of the right femur.

New bone was deposited on the lateral side of the proximal shaft of the left tibia and continued on to the popliteal line on its posterior surface. The area affected, located infero-laterally to the tibial tuberosity, measured 23 mm × 34 mm and 20 mm × 6 mm on the lateral and posterior surfaces of the proximal shaft. New bone formation on the corresponding portion of the right tibia is more prolific (FIG. 45). The area affected measures 24 mm × 44 mm on the proximal shaft laterally, and 32 mm × 20 mm posteriorly. As the new bone appears to be remodelled, it is suggested that the causative agent was not active at the time of death of this individual.

Small irregular bony outgrowths also occur on the antero-medial surface of the proximal shaft of each tibia (distal to the tibial tuberosity). The area affected is larger on the left. Moderate lipping was recorded on the rim of the superior fibular articular facet on the right tibia (FIG. 46). 50% of it is present. The presence of an area of porosity on a portion of this facet measuring 6 mm × 4 mm may indicate that the proximal articulation of the right tibia and fibula was affected by osteoarthritis.

Osteoarthritis is the most common joint disease and its aetiology is multifactorial. It develops from the interplay of age, systemic and genetic predisposition of the individual and the mechanical loading of the joints in activities (Rogers and Waldron 1995, 33). Analogous modifications are present on the right fibula: irregular osteophytes were observed on the rim of its proximal articular facet. In addition areas of irregular new bone

FIG. 46. Marginal lipping on the superior fibular articular facet on the right tibia of Individual 2.

TABLE 21. Postcranial remains of Individual 2 (secondary burial).

Skeletal element	Completeness (%)					
Left clavicle	95%, 1 fragment					
Left scapula	25%, 1 fragment					
	No. of fragments	Proximal epiphysis	Diaphysis by thirds proximal	middle	distal	Distal epiphysis
Left humerus	2	0%	10%	100%	100%	100%
Left radius	1	0%	0%	30%	90%	0%
Left ulna	2	80%	15%	0%	80%	0%
Left femur	1	70%	100%	100%	100%	90%
Left tibia	2	90%	100%	100%	80%	0%
Left fibula	2	0%	75%	100%	50%	0%
Left innominate	20%, 3 fragments					
Left hand						
carpals	0					
metacarpals	2nd (100%), 3rd (100%), and 5th (55%) metacarpals					
phalanges	1 proximal					
Left foot						
tarsals	calcaneus (80%), talus (95%), navicular (95%)					
metatarsals	0					
phalanges	0					
Right clavicle	50%, 1 fragment					
Right scapula	65%, 1 fragment					
	No. of fragments	Proximal epiphysis	Diaphysis by thirds proximal	middle	distal	Distal epiphysis
Right humerus	1	100%	100%	100%	100%	0%
Right radius	2	0%	50%	100%	100%	50%
Right ulna	1	100%	20%	0%	0%	0%
Right femur	1	50%	100%	100%	100%	90%
Right tibia	2	90%	100%	100%	100%	85%
Right fibula	2	30%	100%	100%	75%	0%
Right innominate	60%, 4 fragments					
Right hand						
carpals	0					
metacarpals	2nd (95%) and 3rd (75%) metacarpals					
phalanges	3 proximal, 2 intermediate, 1 distal					
Right foot						
tarsals	calcaneus (50%), cuboid (95%)					
metatarsals	0					
phalanges	1 proximal					
Sternum	20%, 1 fragment					
Vertebrae	Cervical	Thoracic	Lumbar			
	1 atlas vertebra and 3 bodies	6 bodies and 3 neural arches	2 neural arches			
Sacrum	1st sacral vertebra (50%)					
Left ribs	9 proximal ends (heads) and 5 shaft fragments					
Right ribs	6 proximal ends (heads) and 7 shaft fragments					

formation occur on the lateral surface of the proximal shaft (45 mm × 8 mm), the antero-distal shaft (20 mm × 2 mm), and the medio-distal shaft, immediately proximal to the distal articulation.

The left fibula was too damaged for the presence/absence of analogous osseous modifications to be recorded.

Although no pathological modifications were recorded on the posterior (vertebral) articular facets on the ribs present, a portion of an ossified cartilage was attached to a fragment of the anterior (sternal) end of a left rib. It measured 7 mm × 8 mm and has undergone post-depositional damage. Ossification of cartilage may result from disease, trauma and/or be associated with the natural ageing process. Incompleteness of this skeleton prevented diagnosis.

5. Conclusion: A Summary, and a Look Ahead (By A.J.N.W. Prag)

There is a delicious irony in the fact that it is the extraordinarily conscientious and meticulous work of the despised 'government clerk of the name of Stamatakes', not just in the field at Mycenae but also in setting out the finds for display and recording them, rather than the flamboyant and spectacular whirlwind that was Schliemann, which has provided both the opportunity and inspiration for a project that has taken the study of their joint finds in Grave Circle A into the twenty-first century. It is perhaps unexpected that 'Stamatakis's bones' should have survived so well where Schliemann's did not; certainly the chain of events that led to this study was serendipitous if not miraculous. The recognition—one might say the rehabilitation—of Stamatakis has been in train for the last twenty or thirty years: we hope that our work on his finds, in the context of the remains from Grave Circle A as a whole, has provided another step to speed his upward path, but without in any way denigrating Schliemann's achievement.

The facial reconstructions suggest that the two men from Shaft Grave VI were related to each other, but give no clues to any kinship with the folk buried in Grave Circle B, and the DNA cannot help us here either. There are some interesting comparisons to be made with that other circle. The proportion of females among those buried in the two circles is much the same (four certain or probable females and eleven adult males, two undefined, and three sub-adults or infants in Circle A, compared to five females, sixteen males, and two children in Circle B) (Angel 1973, 379). When it comes to age at death, Angel noted with some surprise that the average life-span over both circles was only 36, which he put down to 'the stresses of leadership' (with more emphasis on the physical than the psychological aspects), but one can add that the men in Circle B—particularly those buried early in the circle's period of use—seem to have stood a better chance of living into their forties and even their fifties than those in the later Circle A (Z59, I68, N66, and Σ131). Their dental and physical health was generally much the same, with the same unsurprising prevalence of arthritis (Angel 1973, 380–4, 393 and table 1). The conclusions we draw on the activity-related stresses in the lives of the individuals buried in Grave Circle A are of necessity often based on their incomplete remains and should therefore be treated with caution: but that is the material with which we have to work, and it would have been a pity not to try to make full use of the opportunity.

The results of the strontium isotope ratio analyses described in the next article—'Mycenae Revisited Part 2'—are intriguing, although we have to acknowledge that at present they must be tentative in the light of the smallness of the sample of local biologically available $^{87}Sr/^{86}Sr$ and the general scarcity of published strontium ratios from geological settings in Greece. Dr

Nafplioti suggests there that the two certain females and a third individual of unknown sex from Circle A were of non-local origin, in the sense that they came from settlements beyond the immediate surroundings of Mycenae (although not necessarily from areas beyond the Argolid), but further work, which may pinpoint more precisely the non-local origin of these individuals, could have interesting implications for the marital patterns of these Mycenaeans. In contrast both the DNA results and the facial reconstructions suggest that in Circle B at least one female (Γ58) was closely related to two of the men buried in that circle (Γ55 and A62; Prag *et al.* 1995, 125–9; Bouwman *et al.* 2008; ead. *et al.* 2009), which only goes to show that what we have done so far is just the start.

In any study like this, one learns new things all the time. It would be exciting to expand the database of biologically available $^{87}Sr/^{86}Sr$ from the Mycenae area and indeed the wider Argolid and apply strontium isotope ration analyses to the remains from Circle B too. The human remains from Shaft Grave VI itself still have a further intriguing story to tell, thanks to the discovery by Dr Musgrave of a meningioma in the skull of the second individual presented here, and the as yet unexplained radiating perforation and signs of periosteal new bone above the left eye of the first. Both merit more detailed research than we could give them here; like the 'mummy', they provide the material for another project and a further publication. And we like to think that both Stamatakis and Schliemann would have been pleased at what we have attempted to do; whether it could even have provided the basis for a reconciliation must remain a matter for speculation.

National Archaeological Museum, Athens — Lena Papazoglou-Manioudaki
Wiener Laboratory, ASCSA — Argyro Nafplioti
Department of Anatomy, University of Bristol — J.H. Musgrave
RN-DS Partnership, Manchester — R.A.H. Neave
RN-DS Partnership, Manchester — Denise Smith
The Manchester Museum, University of Manchester — A.J.N.W. Prag

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MYCENAE REVISITED PART 2. EXPLORING THE LOCAL VERSUS NON-LOCAL GEOGRAPHICAL ORIGIN OF THE INDIVIDUALS FROM GRAVE CIRCLE A: EVIDENCE FROM STRONTIUM ISOTOPE RATIO ($^{87}Sr/^{86}Sr$) ANALYSIS[1]

Introduction

Strontium isotope ratio ($^{87}Sr/^{86}Sr$) analysis was applied to samples of dental enamel from individuals buried in Grave Circle A (henceforth GCA) at Mycenae and excavated by Schliemann and Stamatakis in order to explore their local versus non-local geographical origin—in other words to answer the question of whether these people were native to Mycenae or came from somewhere beyond the immediate hinterland. The eleven individuals sampled derive from Shaft Graves III, IV, and V and are all adults. This analysis complemented the morphological analysis of the entire collection of human skeletal material recovered from Shaft Graves III, IV, V, and VI in GCA, which at present is kept in the apotheke of the Prehistoric Collection of the National Archaeological Museum in Athens. There was no skeletal material from Shaft Graves I and II present in the collection studied. The results of the morphological analysis of the GCA skeletal collection will be the subject of an article in a later issue of the *Annual* ('Mycenae Revisited Part 3').

Owing to the paucity of published data on the local biologically available strontium in the Aegean region and the rather small number of control samples from Mycenae analysed for the purposes of this study, the results and associated interpretations presented here are tentative, albeit intriguing, and open an avenue for further research. These results indicate that only two of the Mycenaeans tested may be identified as locals at the site, whereas another three appear to be non-locals. Conclusions are less clear for the remaining individuals tested. Although the $^{87}Sr/^{86}Sr$ values for the latter are higher than expected on the basis of the local—at Mycenae—biologically available $^{87}Sr/^{86}Sr$, they may equally reflect either residential change by the relevant individuals or a not-strictly-local diet, i.e. consumption of foodstuffs from outside Mycenae in addition to local ones.

Methods

Principles of strontium isotope ratio ($^{87}Sr/^{86}Sr$) analysis

Strontium isotope ratio analysis ($^{87}Sr/^{86}Sr$) is a very efficient technique for detecting the presence of non-locals among an indigenous population (Bentley 2006). In nature, strontium

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occurs in the form of four stable isotopes, ^{87}Sr (comprises c.7.04% of total strontium), ^{88}Sr (c.82.53%), ^{86}Sr (c.9.87%), and ^{84}Sr (c.0.56%). The strontium isotope ^{87}Sr is radiogenic and is the product of the radioactive decay of the rubidium isotope ^{87}Rb, which has a half-life of approximately 4.7×10^{10} years. The other three strontium isotopes are all non-radiogenic (Faure 1986). Therefore the strontium isotope ratio ($^{87}Sr/^{86}Sr$) in any local geology depends on the relative abundance of rubidium and strontium and on the age of the rocks. The strontium isotope ratio ($^{87}Sr/^{86}Sr$) passes from the bedrock into the soil and groundwater and hence into the food chain, reaching human tissue from the food and water consumed by each individual. $^{87}Sr/^{86}Sr$ in human tissues therefore reflects local geology (Graustein 1989).

Its application to archaeological research, and particularly to studies of residential change, is based on the properties of strontium (the fact that $^{87}Sr/^{86}Sr$ is site-specific) and the possibility of identifying migrants who moved between geologically different regions by comparing ratios measured in human skeletal tissues (bone and dental enamel) formed at different ontogenetic stages (Price *et al.* 1994; Price *et al.* 2000). Dental enamel is a cell-free tissue that forms during early childhood and does not remodel thereafter (Hillson 2002, 148). Bone on the other hand undergoes continuous replacement of its inorganic phase, and $^{87}Sr/^{86}Sr$ measured in bone reflects the last seven to ten years of the life of the individual (Parfitt 1983). In theory, therefore, significant differences in the strontium isotope ratios measured in samples of bone and dental enamel from an individual indicate that he/she spent his/her childhood at a location geologically and isotopically different from his/her residence prior to death (Sealy *et al.* 1991).

THE GEOLOGICAL SETTING

The Aegean is a geologically highly variable region which is divided into isopic zones that share a common geological history (FIG. 1) (Higgins and Higgins 1996). Mycenae in the Argolid falls within the Pindos zone and was built on a knoll formed of Late Triassic to Middle Jurassic limestones (FIG. 2). The latter also underlie the hills to the north and south of the site and the mountain range to the east. The greatest portion of the valley between the hills and the ridge that runs southwards from west of the acropolis is formed by marls and conglomerates deposited during the Late Pliocene to Pleistocene. The site was supplied with water from a spring located 200 m east of the acropolis. This was fed by water falling on Mt Ailias, which then descended to the valley bottom through Pleistocene marls and emerged on the surface through ancient scree deposits (Higgins and Higgins 1996, 48).

DISTINCTION BETWEEN LOCALS AND NON-LOCALS AT MYCENAE

The variation in the local $^{87}Sr/^{86}Sr$ values in the food chain cannot simply be equated to $^{87}Sr/^{86}Sr$ in bedrock geology (Faure 1986; Price *et al.* 2002), because the range of $^{87}Sr/^{86}Sr$ values for the local soils results from the differential weathering of the various minerals within the rocks, the mixing of various sources of sediment within the soil, and the groundwater, which may incorporate deeper, older waters (Jorgensen *et al.* 1999). Therefore the present study used regional animal samples to characterize the local biologically available $^{87}Sr/^{86}Sr$ at Mycenae and to distinguish between locals and non-locals at this site.

Following Price *et al.* (2002), in order to provide an objective means of distinction between locals and non-locals at Mycenae, the author measured the local biologically available strontium isotope ratios determined from archaeological and modern animal tissues (i.e.

FIG. 1. Isopic zones and massifs of the Aegean region. After Higgins and Higgins (1996: fig. 2.2).

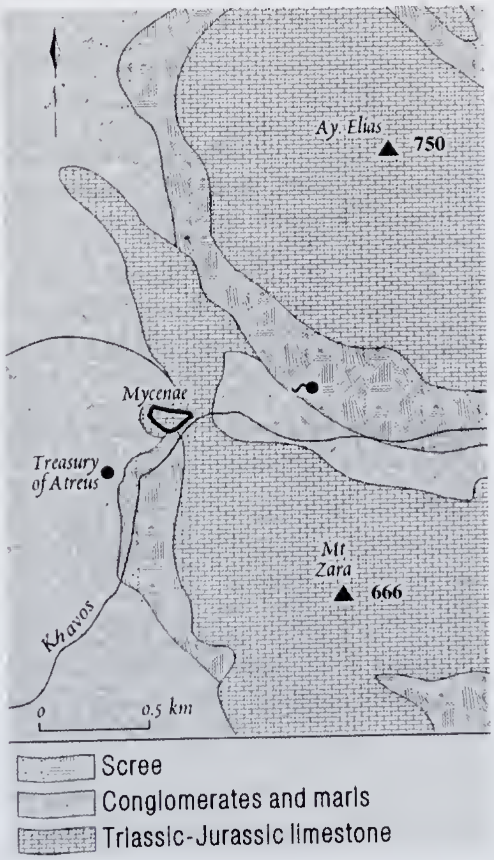

FIG. 2. Geological map of Mycenae in the Argolid. After Higgins and Higgins (1996: fig. 5. 5).

dental enamel and shell respectively), and calculated the range of the mean local biologically available strontium isotope ratio ± 2 standard deviations. If the individual was born, raised, and spent at least the last 7 to 10 years of his/her life in the local area, $^{87}Sr/^{86}Sr$ analysis of dental enamel and bone tissue of that individual should show very similar values to the local biologically available $^{87}Sr/^{86}Sr$ (Steele and Bramblett 1988).

Animal skeletal tissues are preferred to human bone as they provide an average of the biologically available $^{87}Sr/^{86}Sr$ of the local feeding territories, which they occupied in life. Dental enamel in particular is more resistant to post-depositional chemical and physical modifications compared with bone and dentine, because it is denser, harder and more inert (Kohn *et al.* 1999; Bentley 2006). In this study strontium isotope ratio was measured in the dental enamel of one archaeological pig from Grave V that was among the few animal skeletal remains recovered and stored together with the human remains from that grave. Pigs are preferentially sampled because their amino acid requirements and diet are similar to those of humans and because pigs have a very low mobility (Van der Merwe *et al.* 2003; Bentley 2006, 23).

Strontium isotope ratio was also measured in samples from modern snail shells in order to sample both archaeological and modern animals from across the postulated food catchment area of the Bronze Age population of Mycenae. This is a zone within walking distance from the acropolis from where the population would have got their water and food supplies, arbitrarily set at approximately 3 to 4 km radius. The local biologically available $^{87}Sr/^{86}Sr$ cannot simply be equated to the $^{87}Sr/^{86}Sr$ in the bedrock geology (Faure 1986; Price *et al.* 2002); however, in an attempt to sample the entire range of the local biologically available $^{87}Sr/^{86}Sr$ at Mycenae, the modern snails were collected from different locations within the postulated food catchment area of the Mycenae population, based on information on underlying geology (Higgins and Higgins 1996). One snail was collected from inside the acropolis of Mycenae, two from the area surrounding the fortifications (≤500 m), and the last one at 2 km south-west of the acropolis. The geology of the sampling region is variegated and comprises Late Triassic to Middle Jurassic limestone, Late Pliocene to Pleistocene conglomerates and marls, and scree deposits (Higgins and Higgins 1996, 48) (FIG. 2). In addition, by broadening the sampling area to collect snails from a radius of 2 km around the site under investigation, the possibility that some contamination of shell samples by local $^{87}Sr/^{86}Sr$ may remain after mechanical and chemical cleaning of the specimens or that the home ranges of the snails are too local is minimised; either of these would artificially narrow the range of the local biologically available $^{87}Sr/^{86}Sr$ determined from these samples (Price *et al.* 2002). To avoid sample contamination from pollutants and/or soil fertilizers, snails were collected from areas of wild vegetation with no sign of human cultivation in the immediate vicinity (Price *et al.* 2002, 122–9; Bentley 2006).

Unfortunately, as this is the first published study of this kind in the Argolid, there are no other data on the local biologically available $^{87}Sr/^{86}Sr$ in this region that could be used to explore probable geographical origins within the Argolid for individuals identified as non-locals at Mycenae. Moreover, for the reasons given above (Faure 1986; Jorgensen *et al.* 1999; Price *et al.* 2002), inter-site variation in the local biologically available $^{87}Sr/^{86}Sr$ in the Argolid cannot safely be predicted from variation in local geology either. In addition, the only $^{87}Sr/^{86}Sr$ data available on the geology of Greece is for igneous rocks (Pe-Piper and Piper 2002), and is of no direct use in the present study. In the study by Pe-Piper and Piper (2002)

$^{87}Sr/^{86}Sr$ values are reported to the third decimal digit, whereas the author's own past and recent research in population mobility in the Aegean detected significant inter-regional differences in $^{87}Sr/^{86}Sr$ values at the fourth decimal digit of these values (Nafplioti 2007; 2008*a*; 2008*b*). For all these reasons the present study will only test the hypothesis that the individuals analysed were born and raised at the site of Mycenae. On present data, it cannot be established with certainty whether any non-locals identified originated from sites 10, 50, or hundreds of km away from Mycenae; this would require a detailed mapping of the variation in the local biologically available $^{87}Sr/^{86}Sr$ values in the Aegean region that exceeds the scope and logistics of this study.

PROCEDURE

Preparation and analysis of samples for the measurement of $^{87}Sr/^{86}Sr$ was undertaken by the author in the National Oceanography Centre in Southampton. The protocol followed is that described by Nafplioti (2008*a*), with a small modification to the procedure at the stage of the acetic acid cleaning of samples. Following Bentley *et al.* (2004, 371), samples were rinsed in ultra-pure H_2O after the first hour of bathing in 5% acetic acid and then placed back in fresh 5% acetic acid and left overnight in order to minimize the likelihood that diagenetic strontium dissolved during the first hour of the acid cleaning would remineralize back into the sample. The strontium isotope ratio of the samples was measured (to the sixth decimal digit) by a Thermal Ionization Mass Spectrometer.

Materials

Dental enamel samples from eleven individuals were analysed to measure $^{87}Sr/^{86}Sr$. These eleven samples were from GCA Shaft Graves III (three individuals), IV (four individuals, two of whom are individuals 27 Myc. and 22 Myc. in Angel's 1973 report), and V (four individuals, two of whom are individuals 25 Myc. and 26 Myc. in Angel 1973). The first molar was preferentially sampled, as its crown develops during early childhood and is complete by the fifth year of life (Ubelaker 1989). However, in four individuals for whom sampling of the first molar was not possible the second molar was substituted (MYCA2, V), or the third premolar (MYC1, III, MYC2, IV, and MYCA1, V), because their crowns are formed within roughly the same period of the individual's life (Ubelaker 1989). In all cases enamel was extracted from the buccal, lingual, mesial and/or distal surfaces of the tooth crown, and in particular from the superior half/third of the crown that is formed earlier in the life of the individual than its inferior portion. A description and provenance of the human samples analysed are provided in TABLE 1.

Results

Analysis was undertaken to investigate the hypothesis that non-locals are present among the high-status individuals interred in the Shaft Graves in GCA at Mycenae. In order to confirm this hypothesis the ratios for the human enamel samples analysed should fall outside the range of the mean local-at-Mycenae biologically available strontium isotope ratio ± 2 standard deviations.

Strontium isotope ratio ($^{87}Sr/^{86}Sr$) was measured in enamel samples from eleven

TABLE 1. Strontium isotope ratio ($^{87}Sr/^{86}Sr$) analysis: description of human samples analysed.

Key: M1=1st molar, M2=2nd molar, Pm3=1st premolar.

Geographical region	**Skeletal collection**	**Individual**	**Element**
Mycenae, Argolid	Grave Circle A, Grave III	MYC1, III	Tooth (Pm3)
	Grave Circle A, Grave III	MYC2, III	Tooth (M1)
	Grave Circle A, Grave III (commingled dental material)	MYCA, III	Tooth (M1)
	Grave Circle A, Grave IV	MYC1, IV (27 Myc. Angel 1973)	Tooth (M1)
	Grave Circle A, Grave IV	MYC2, IV (22 Myc. Angel 1973)	Tooth (Pm3)
	Grave Circle A, Grave IV	MYC3, IV	Tooth (M1)
	Grave Circle A, Grave IV (mandible 4)	MYCA, IV	Tooth (M1)
	Grave Circle A, Grave V	MYC1, V (25 Myc. Angel 1973)	Tooth (M1)
	Grave Circle A, Grave V	MYC2, V (26 Myc. Angel 1973)	Tooth (M1)
	Grave Circle A, Grave V (loose dental material)	MYCA1, V	Tooth (Pm3)
	Grave Circle A, Grave V (loose dental material)	MYCA2, V	Tooth (M2)

TABLE 2. Strontium isotope ratio ($^{87}Sr/^{86}Sr$) values for the Mycenae individuals, dental enamel.

Key: M1=1st molar, M2=2nd molar, Pm3=1st premolar.

Individual	**Element analysed**	**Strontium isotope ratio**
MYC1, III	Pm3	0.708257
MYC2, III	M1	0.708820
MYCA, III	M1	0.708611
MYC1, IV	M1	0.708537
MYC2, IV	Pm3	0.708224
MYC3, IV	M1	0.708582
MYCA, IV	M1	0.708494
MYC1, V	M1	0.708569
MYC2, V	M1	0.708572
MYCA1, V	Pm3	0.708767
MYCA2, V	M2	0.708763

individuals from Graves III (3), IV (4), and V (4) in GCA. The results are given in TABLE 2 and are graphically represented in FIG. 3. On the graph, the black bars represent ratios for dental enamel samples. The horizontal band of squares marks the range of the mean local-at-this-site biologically available strontium isotope ratio, as determined from modern snail shell samples, ± 2 standard deviations (SD). The mean $^{87}Sr/^{86}Sr$ for the snail samples was calculated as

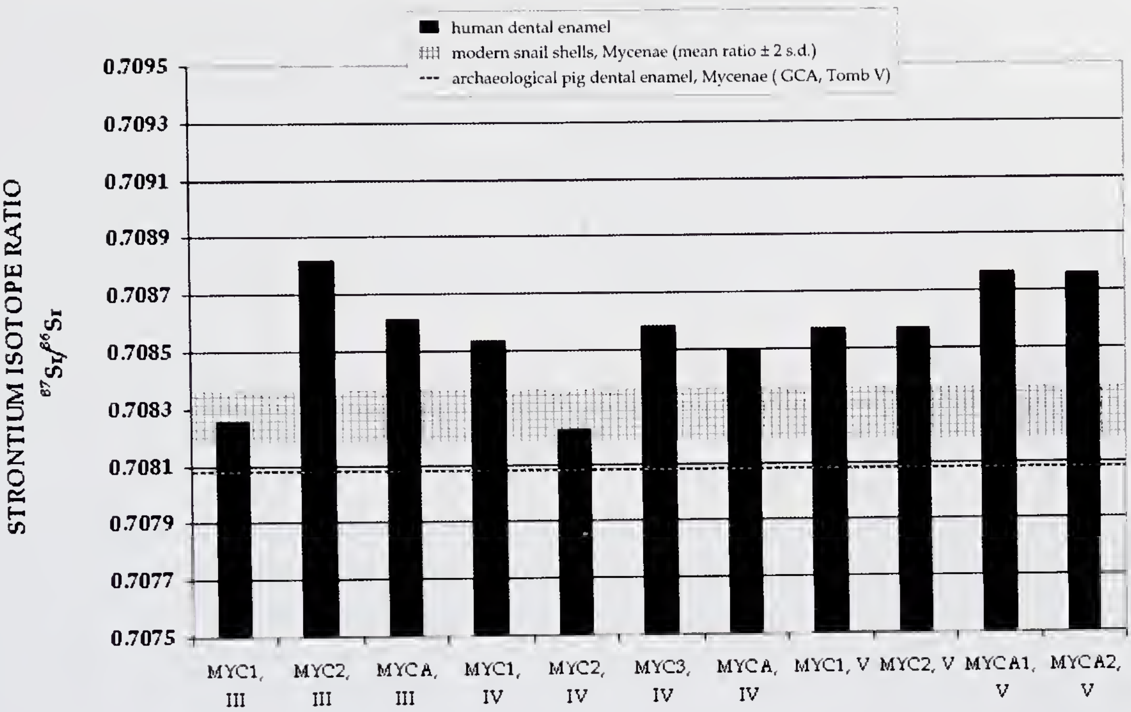

FIG. 3. Strontium isotope ratios measured in dental enamel samples from Mycenae GCA individuals.

0.708267 ± 0.000043 and the range for 2 standard deviations is 0.708181 to 0.708353. This range of $^{87}Sr/^{86}Sr$ values is used as the confidence limit for the distinction between locals and non-locals at Mycenae. The horizontal interrupted line on this graph marks the $^{87}Sr/^{86}Sr$ value measured in the dental enamel of the pig from Grave V. This ratio is 0.708082 and is lower than those measured for the four snail shell samples (TABLE 3).

The mean $^{87}Sr/^{86}Sr$ measured in enamel samples from the eleven GCA individuals was calculated as 0.708563 ± 0.00019. The range of strontium isotope ratio values is between 0.708224 and 0.708820 and the intra-group variation (SD = 0.00019) for this skeletal collection is higher compared with three Middle to Late Bronze Age collections from Knossos on Crete, viz. the Ailias (SD = 0.000099), Gypsades (SD = 0.000025), and Sellopoulo collections (SD = 0.000147), and lower compared with the Late Bronze Age collections from Aplomata on Naxos (SD = 0.00062) and KSP (Knossos South of the Palace) (SD = 0.000251) respectively (Nafplioti 2007, 302; 2008*a*).

Ratio values for only two of the eleven GCA individuals analysed, MYC1, III (0.708257) and MYC2, IV (0.708224), fall within the range of the mean local biologically available $^{87}Sr/^{86}Sr$ at Mycenae ± 2 SD (0.708181 to 0.708353) as determined from modern snail shell samples (FIG. 3). By contrast, ratios measured in enamel samples from the other nine individuals have values ranging between 0.708494 and 0.708820, and are therefore higher than the confidence limit for the distinction between locals and non-locals at Mycenae (0.708181 to 0.708353) based on the snail shell criterion and the ratio for the pig dental enamel (0.708082). Therefore using the snail shell criterion, individuals MYC1, III (probable male) and MYC2, IV (male) from Graves III and IV, can be identified as locals at Mycenae.

TABLE 3. Strontium isotope ratio ($^{87}Sr/^{86}Sr$) values for samples used to determine the local biologically available $^{87}Sr/^{86}Sr$ at Mycenae; archaeological animal dental enamel and modern snail shell.

Key: SN=snail, P=pig, M3=3rd molar.

Individual	Element analysed	Strontium isotope ratio
MYC1 SN	Shell	0.708262
MYC2 SN	Shell	0.708254
MYC3 SN	Shell	0.708226
MYC4 SN	Shell	0.708328
MYC5 P	M3	0.708082

Strontium isotope ratios for the other nine GCA individuals form two groups, group A having $^{87}Sr/^{86}Sr$ values between 0.7085 and 0.7086, and group B having $^{87}Sr/^{86}Sr$ values around 0.7088. Group A comprises six individuals from Graves III (1), IV (3) and V (2), and their ratios range between 0.708494 and 0.708611. Four of these individuals for whom biological sex was confidently determined are males. Group B comprises three individuals from Graves III (1) and V (2), two of whom are identified as females, one from Grave III and one from Grave V. The two loose teeth from Grave V analysed probably represent two individuals (MYCA1, V and MYCA2, V), one of whom is identified as female. Ratios measured for these three individuals are between 0.708763 and 0.708820 and clearly fall above the confidence limit for characterizing the indigenous population at Mycenae based on snail shell samples (0.708181 to 0.708353).

As mentioned in the 'Methods' section, it is possible that the local biologically available strontium isotope ratios at Mycenae determined from modern snails may be too local and lower than in reality, due to the limited home ranges of the snails (Price *et al.* 2002, 125), diagenesis (post-depositional substitution of biogenic from diagenetic strontium in shell samples), and/or contamination through fertilizers (Bentley 2006, 158). In order to control for such an artificial narrowing of the range of the local biologically available strontium isotope ratios, the snails were selected from a broad area some 2 km in radius so as to sample from different geological regions of the site (Higgins and Higgins 1996, 48), and were selected with care to avoid any cultivation-related contamination of the samples. Moreover, the lower ratio (0.708082) measured in the enamel sample from the pig from Grave V is not consistent with an artificial lowering of the range of the local biologically available strontium isotope ratios at Mycenae induced by the analysis of modern snail shells. As already mentioned, pig enamel samples are very useful in the characterisation of the local biologically available strontium, as pigs have a diet comparable to that of humans and are animals of rather low mobility.

One should acknowledge that five control samples form a rather small set of data for the range of the local biologically available $^{87}Sr/^{86}Sr$ values at Mycenae; nevertheless it is very improbable that even with more extensive data this range would be broad enough to include the ratios (0.708763, 0.708767, 0.708820) for the three individuals from group B that clearly fall above the confidence limit (0.708181 to 0.708353) determined from modern snail samples alone and are also higher than the ratio for the pig dental enamel (0.708082). In

addition, although small, the number of the control samples used in this study is not atypical of similar $^{87}Sr/^{86}Sr$ studies in the literature (e.g. Bentley and Knipper 2005; Tafuri *et al.* 2006; Richards *et al.* 2008; Slovak *et al.* 2009). Even if the confidence limit for the distinction between locals and non-locals at Mycenae is calculated as the mean ratio measured in the four snail shell samples and the archaeological pig enamel sample ± 2 SD (0.708230 ± 0.000182), the range of $^{87}Sr/^{86}Sr$ values is between 0.708048 and 0.708412, and it is much lower than the ratios measured for the individuals MYC2, III, MYCA1, V and MYCA2, V. Hence, on present data, the hypothesis that these three individuals are non-locals at Mycenae cannot be rejected.

Conclusions regarding the local versus non-local origin of the six individuals from group A (MYCA, III, MYC1, IV, MYC3, IV, MYCA, IV, MYC1, V and MYC2, V) have to be tentative. Although their $^{87}Sr/^{86}Sr$ values (0.708494 to 0.708611) fall above the confidence limit for the characterization of the indigenous Mycenae population based on snail shell samples and the pig enamel ratio, their identification as non-locals is less certain than for the three individuals from group B. The difference between the highest limit (0.708353) of the range of the local biologically available strontium isotope ratios at Mycenae determined from snail shell samples and the highest ratio for group A (0.708611) is calculated as 0.000258 and is almost half the difference between the highest limit of the range of local ratios and the highest $^{87}Sr/^{86}Sr$ value (0.708820) for group B, calculated as 0.000467. Thus because of the paucity of data available on the local biologically available $^{87}Sr/^{86}Sr$ at the site under investigation and its periphery, and the comparatively small difference between the ratios for the six individuals of group A and the confidence limit for the characterization of the indigenous Mycenae population, one cannot safely draw a final conclusion on their local versus non-local origin.

It is possible that the over-representation of non-locals (nine out of the eleven individuals tested) in GCA suggested by this study may also reflect the consumption at Mycenae of food resources cultivated or raised non-locally and/or game captured from the periphery of this site. In the absence of any published $^{87}Sr/^{86}Sr$ data on the geology of Mycenae and the Argolid region this possibility cannot be excluded. In this context, Richards and Hedges (2007) argued for the consumption of marine foods by the individuals from Grave Circle A based on comparatively high bone collagen $\delta^{15}N$ values for the nine individuals whom they tested. Although the lack of control samples from Mycenae limits the value of their conclusions, as they too acknowledged, these results are intriguing in relation to the higher than expected $^{87}Sr/^{86}Sr$ values for nine of the eleven individuals tested in this study. Consumption of marine resources is expected to have increased the $^{87}Sr/^{86}Sr$ skeletal values of the local Mycenae population towards the seawater signature (Slovak *et al.* 2009), thus elevating these values above the local biologically available strontium at Mycenae as determined from local terrestrial fauna; see Veizer (1989) for variation in $^{87}Sr/^{86}Sr$ values in seawater through time.

FIG. 4 provides information on the local biologically available $^{87}Sr/^{86}Sr$ at two sites in the Aegean, Manika on Euboea and Knossos on Crete, to explore further the local versus non-local origin of the nine 'uncertain' individuals from GCA. This information derives from the author's past and recent research in this region (Nafplioti 2007; 2008*a*; 2008*b*). Two horizontal bands on this graph mark the confidence limits for the distinction between locals and non-locals at Knossos based on archaeological animal dental enamel samples (grey) (0.708481 to 0.709373) and modern snail shells samples (hatched lines, oriented to the left) (0.708923 to 0.709047). A third band (hatched lines, oriented to the right) marks the range

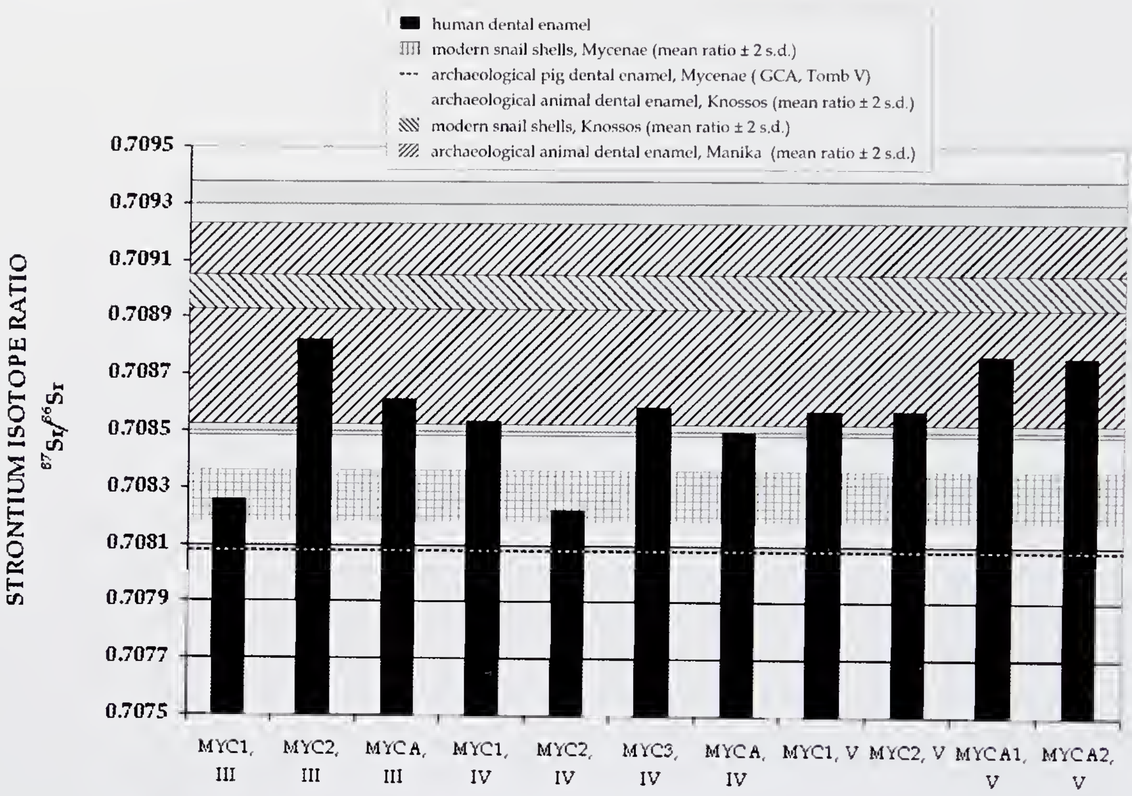

FIG. 4. Strontium isotope ratios measured in dental enamel samples from Mycenae GCA individuals.

of the mean local biologically available strontium isotope ratio at Manika determined from archaeological animal dental enamel samples ± 2 standard deviations (0.708524 to 0.709228). These three horizontal bands overlap, but they are higher than the one that marks the confidence limit for the characterization of the indigenous population at Mycenae (0.708181 to 0.708353).

Ratios for all nine GCA individuals identified as non-locals at Mycenae using the snail shell criterion fall within the confidence limit for the distinction between locals and non-locals at Knossos (based on archaeological animal dental enamel samples). Eight of these also fall within the range of the mean local biologically available strontium at Manika ± 2 standard deviations. Given the paucity of published $^{87}Sr/^{86}Sr$ data on the geology of the Aegean, the author is not here using the data on the local biologically available strontium isotope ratios at Knossos and Manika to suggest that the individuals in question from GCA may have originated from Knossos or Manika. Rather, one can safely argue from the present data that the food catchment area of the Mycenae GCA population group, as represented by these nine individuals of uncertain geographical origin, is more compatible with sites geologically and isotopically similar to Knossos on Crete and Manika on Euboea than with Mycenae. These sites may well be within the Argolid and not too distant from Mycenae. However, for the reasons outlined earlier under 'Methods', the data currently available is not sufficient to explore this possibility.

Conclusions

Based on the results of the strontium isotope ratio analysis of dental enamel samples from eleven GCA individuals, individuals MYC1, III and MYC2, IV may be suggested to be locals at Mycenae. Ratios measured for the other nine individuals fall above the confidence limit for the characterization of the indigenous Mycenae population as determined from snail shell samples. Thus, allowing for the small amount of data on the local biologically available $^{87}Sr/^{86}Sr$ at Mycenae, they can be identified as non-locals at Mycenae. However, conclusions concerning the local versus non-local origin of the six individuals from group A, MYCA, III, MYC1, IV, MYC3, IV, MYCA, IV, MYC1, V and MYC2, V, are tentative. Owing to the paucity of data on the local biologically available $^{87}Sr/^{86}Sr$ at sites in the Aegean, just as easily as a non-local origin their higher ratios may reflect a variegated diet and consumption of 'non-local' foodstuffs from the periphery of Mycenae up to 5 to 10 km distant from the acropolis of Mycenae or from more distant region(s), where the local biologically available strontium isotope ratios are higher. This would not be unexpected in the context of a Mycenaean palace economy of the 'redistributive' type, for which there is an overall consensus in Prehistoric Aegean scholarship (Bendall 2007). In addition, to some extent these results may reflect the consumption of marine resources that was suggested for the individuals from Grave Circle A by Richards and Hedges (2007).

By contrast, one cannot reject the hypothesis that the three individuals from group B (MYC2, III, MYCA1, V, and MYCA2, V) are non-locals at Mycenae. It is worth noting that, on present data, the only two securely identified females among the eleven GCA individuals tested here were among the three individuals from group B, who are identified as non-locals at Mycenae. Seven of the remaining nine GCA individuals tested are males, whereas for the other two biological sex could not be determined. Allowing for low sample size, this finding may possibly reflect marital patterns and the non-local origin of females associated with high social ranking at Mycenae. Marriage alliances between high-status families as a means of consolidating socio-political power have widely been documented for past and present societies in different times and places, such as Egypt during the New Kingdom (Bryce 2005), the lowland Mayas and Incas in pre-Hispanic America (Marcus 1973; Covey 2003; 2006), the early modern French (sixteenth to seventeenth century: Kettering 1989), and the Swazi in twentieth-century Southern Africa (Kuper 1978). The intermarried families may be culturally different or not; the latter would more probably be the case for the Mycenaean elites. Although on present data this theory cannot safely be argued for the Mycenaeans, it is nonetheless plausible and could be investigated further by a sampling programme in the Argolid and other Peloponnesian regions to determine the local biologically available strontium at other prominent contemporary sites.

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KINSHIP IN AEGEAN PREHISTORY? ANCIENT DNA IN HUMAN BONES FROM MAINLAND GREECE AND CRETE[1]

Introduction

In the *Annual* for 2000 we reported on a pilot project in which we had—successfully—searched for traces of ancient DNA (aDNA) in the skeletal remains from Grave Circle B at Mycenae, as part of a cross-disciplinary project seeking to discover links of kinship between the different groups of graves in which we used the methods of facial reconstruction and of epigenetic variation as well as DNA analysis (Brown *et al.* 2000). We believed that such an approach might cast light on dynastic links in a period of prehistory where there could be no texts to tell the story, and we ended that report on an optimistic note: advances in molecular biology and the concomitant development of techniques for studying aDNA made it likely that as well as establishing kinship relationships between burials or groups of burials (Brown 2001), in conjunction with bone isotope studies (Price 1989) it would be possible to identify individuals who might be incomers to a particular site. This would be especially interesting if applied to sites such as the Grave Circles at Mycenae, where the remains are presumed to be those of individuals who held high status in their societies, and whose family relationships might reveal the underlying processes by which such status was acquired.

Broader population studies might indicate affinities between the people living in different areas at different periods, possibly throwing light on questions such as the relationship between the Minoan and Mycenaean civilizations. Ancient DNA research could also answer long-standing questions about disease in the prehistoric Aegean, in particular to test hypotheses regarding the prevalence of malaria (Angel 1966). As well as searching directly for aDNA signatures of the malaria parasite in human bones (Sallares and Gomzi 2001), typing of globin gene mutations could determine if the skeletal indications of anaemia are indeed due to genetic thalassaemia rather the result of dietary iron deficiency (Chilvers 2004, where the rationale for this approach is explained).

Progress in any of these areas is clearly dependent on the survival of aDNA in human skeletons from sites in the eastern Mediterranean, in particular in Greece and the Aegean. It has become clear that the most important consideration in this regard is not the chronological age of the specimens but their thermal history, as DNA degradation occurs

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more rapidly at higher temperatures. A useful measure is 'thermal age' (Smith *et al.* 2003), which is calculated from the temperature history of a site and its geographical location. From experimental studies of DNA breakdown, together with a consideration of the oldest authenticated detections of aDNA, it has been estimated that the limit for DNA preservation is approximately 19,000 years at 10°C: hence specimens from any site that has a thermal age normalized to 10°C at >19,000 years are unlikely to contain aDNA. When the formula described in Appendix B of Smith *et al.* (2003) is applied, using modern data for mean annual temperatures and assuming that while *in situ* specimens were not subjected to substantial seasonal fluctuations, then for the eastern Mediterranean a thermal age of 19,000 years at 10°C corresponds to approximately 3600 chronological years (Chilvers 2004). This makes it unlikely that aDNA will be present at Neolithic and Early Bronze Age sites which predate 2000 BC, and suggests that the Bronze Age sites of the Minoan palace period (*c.*1850–1200 BC) and of Mycenaean Greece (*c.*1650–1150 BC) will be at the very limits for aDNA preservation. At these sites we can therefore anticipate that local factors such as exposure to water and the time that has elapsed since excavation (Pruvost *et al.* 2007) will be crucial in determining if aDNA can be recovered.

This article presents the next stage in our research into aDNA: whereas the pilot was restricted to material from Grave Circle B, we have extended it both in time and space in order to work with a wider corpus of samples. The sites from which we have been able to take samples are Nea Nikomedia, Lerna, Karaviádena (Zakro), Antron (Fthiotida), Kouphovouno, and Mycenae, ranging in date from the later seventh millennium BC to the middle of the second and covering a geographical spread from central Macedonia to Laconia and on to eastern Crete. The timing of our work was such that through the kindness of Dr Lena Papazoglou-Manioudaki we were able in 2006 to sample the two recently rediscovered skeletons from Shaft Grave VI at Mycenae, and through collaboration with Professor William Cavanagh we were also able to study material excavated between 2001 and 2002 at Kouphovouno. In parallel to the DNA studies, during 2007–8 our colleague Dr Argyro Nafplioti carried out strontium isotope analyses of the human remains from both grave circles at Mycenae (Nafplioti 2009).

Previous studies of bones and teeth from prehistoric Greece support the prediction that aDNA is recoverable from some sites dating to 2000 BC, with local factors having an important impact on preservation (Evison *et al.* 1999; Brown *et al.* 2000; Evison 2001). Although carried out to the highest standards prevailing at the time, these studies took place before stringent criteria for aDNA authenticity had been established (Cooper and Poinar 2000), and in retrospect it appears probable that some of the 'detections' of aDNA described in these papers were in fact due to modern contamination. Conversely, it is possible that some specimens that gave negative results in these projects would have yielded authentic aDNA if the highly sensitive polymerase chain reactions (PCRs) now available had been used. As well as continuing our work at Mycenae, we have therefore also carried out a systematic survey of aDNA preservation at six Neolithic and Bronze Age sites in Greece and Crete, examining 89 skeletons in total, and using the most up-to-date aDNA techniques, in order to evaluate the broader potential of aDNA research in the Eastern Mediterranean.

Materials and Methods

1. SITES AND BONE SPECIMENS

Bone specimens are listed in TABLE 1 and the locations of the sites from which these were obtained are shown in FIG. 1. The early Neolithic village of Nea Nikomedia is a multi-period settlement mound located on the central Macedonian plain, close to the south-west border of Lake Ludias marshland and excavated in 1961–4 (Rodden 1962; Wardle 1996; Angel 1973*a*). Calibrated radiocarbon dates for the earliest phases of occupation at the site fall into the range 6400–6000 BC (Perles 2001, 99–110). In contrast with other early Neolithic sites, burials have been found within the settlement, many in shallow, irregular pits located outside the houses or in the rubble of older collapsed houses rather than under the floors (Perles 2001, 276–9). Lerna is located in the south-east Argolid, on the western shore of the Bay of Argos and was occupied from the sixth to the first millennia BC; excavations were carried out between 1952 and 1958. During the first phases of occupation in the Neolithic it is likely that the site was some distance from the sea, but as sea levels continued to rise, significant regions of the Argive plain were covered with water and Lake Lerna was formed, creating a marshy environment in the vicinity of the site (Zangger 1991). Although the Neolithic contexts yielded ten burials (Angel 1971, 39–41), the majority date from the Middle Bronze Age (2050/2000–1700/1675 BC). There are no burials in the Early Bronze Age contexts and later burials are rare. The Middle Bronze Age burials are usually found either next to the houses

FIG. 1. Locations of sites.

TABLE 1. Bone specimens.

Site	Date	Number[a]	Description
Nea Nikomedia	6400–6000 BC	Infant 1 (A6/1)	Long bone fragment
		Infant 3 (Ω6/1A)	Long bone fragment
		Infant 5 (B6/2)	Long bone fragment
		NN4 (NN XLI D5/1 IV)	Left clavicle fragment
		NN13* (NN XIIIR7/1C)	Short rib fragment
		NN19 (NN XIX C9/1d)	Long bone fragment
		NN5 (NN L E3 V)	Second metatarsal
		NN23 (NN XXIII TX–5/1)	Right second metatarsal
		NN28 (XXVIII Tα2)	Left third metatarsal
Lerna	6th millennium BC	Ler 220 (EN)	Mandible fragment
	2050–1675 BC	Ler 10	Cranial fragment
		Ler 103	Long bone fragment
		Ler 81	Radius fragment
		Ler 125	Cranial fragment
		Ler 48	Patella
		Ler 203	Cranial fragment
		Ler 72	Radius fragment
Karaviádena	2000–1700 BC	Burial 1a (A1-A2-K3, ZK15)	Left talus
		Burial 1b (A1-A2-K3, ZK16)	Left talus
		Burial 1c (A1-A2-K3, ZK17)	Left talus
		Burial 1d (A1-A2-K3, ZK18)	Left talus
		Burial 2 (A3, ZK8)	Long bone fragment
		Burial 3 (A4-A7, ZK10)	Long bone fragment
		Burial 4–5 (K1-A-A5, ZK19)	Long bone fragment
Antron Grave Circle A	2000–1700 BC	AXLVIIIbMH	Skull fragment
		AXII	Long bone fragment
		AI	Long bone fragment
		AXII	Long bone fragment
		AXLVIIIbLH	Long bone fragment
		ALIII	Long bone fragment
Antron Grave Circle B	2000–1700 BC	BII	Long bone fragment
		BIII	Long bone fragment
		BV	Long bone fragment
Mycenae Grave Circle A	1600–1500 BC	A3.1	Mandible
		A3.2	Mandible
		A3.3	Mandible
		A4.1	Mandible
		A4.2	Mandible
		A4.3	Mandible
		A4.22	Mandible
		A4.27	Mandible
		A5.25	Mandible
		A5.26	Mandible
		A6a	Clavicle
		A6b	Clavicle
		AM	Unrecorded

Site	Date	Number[a]	Description
Mycenae Grave Circle B	1650–1550 BC	Γ51	Long bone fragment
		B52	Long bone fragment
		P53	Long bone fragment
		H54	Long bone fragment
		Γ55	Long bone fragment
		Λ56	Long bone fragment
		Ξ57	Long bone fragment
		Γ58	Long bone fragment
		Z59	Long bone fragment
		Δ60	Long bone fragment
		Δ61	Long bone fragment
		A62	Long bone fragment
		Θ63	Long bone fragment
		N66	Long bone fragment
		N66a	Long bone fragment
		I68	Long bone fragment
		A69	Long bone fragment
		K70	Long bone fragment
		Λ70a	Long bone fragment
		Λ70a1	Long bone fragment
		Λ70a2	Long bone fragment
		Λ70a3	Long bone fragment
Kouphovouno	2000–1700 BC	KE009	Tibia fragment
		KE009B	Tibia fragment
		KE105	Humerus fragment
		KE108	Radius fragment
		KE171	Radius fragment
		KE173	Humerus fragment
		KE186	Tibia fragment
		KE207	Tibia fragment
		KE213L	Humerus fragment
		KE213U	Fibula fragment
		KE216	Rib fragment
		KE220	Femur fragment
		KE601	Femur fragment
		KE704	Skull fragment
		KE705	Humerus fragment
		KE706	Ulna fragment
		KE707	Humerus fragment
		KE713	Tibia fragment
		KE715	Tibia fragment
		KE716	

[a] According to site, inventory or museum records. For osteology reports see for Nea Nikomedia: Angel (1973a), Lagia (1993); for Lerna: Angel (1971), Lagia (1993); for Karaviádena: Arnott and Morgan-Forster (in press); Antron: A.Papathanasiou (unpublished); Mycenae: Angel (1973b), Musgrave *et al.* (1995); Kouphovouno: Lagia (in Cavanagh *et al.* 2007).

or, in the case of some of the infant burials, under the floors of houses. The site of Karaviádena is located on the eastern coast of Crete, somewhat less than a kilometre south of the great Middle-Late Minoan palace at Zakro. During the construction of a road from Epano Zakro to Kato Zakro a grave containing what appear to be six burials was discovered here, and subsequently excavated in 1994 by the Greek Archaeological Service. The burials are believed to date from Middle Minoan II phases of occupation in the area (1850–1700 BC) and may form part of a larger cemetery (at present unpublished, but see Arnott and Morgan-Forster in press; Arnott and Stuckey 2003). Antron (Glypha Bay, Fthiotida) is located on the east coast of mainland Greece. Two grave circles (A and B) adjacent to one another were excavated in 1990–1995: most of the burials were in cist graves and dated to the Middle Helladic III to Late Helladic II A periods (1750–1450 BC) (Papakonstantinou 1999*a* and *b*). Mycenae is located in the north-east of the Peloponnese. Grave Circles A and B date to 1675–1500 BC, Grave Circle B predating A with possibly fifty years' overlap between the two. The Grave Circles therefore date to the very beginning of the Mycenaean age at the boundary of the Middle to Late Helladic periods. Within Grave Circle B, excavated in 1952–4, there is a development from simple cist burials to larger, deeper and richer Shaft Graves, while Grave Circle A, dug in 1876–7, comprises six Shaft Graves (Mylonas 1957). Kouphovouno, located in Laconia just south of Sparta, spans the Middle Neolithic to Late Bronze Age periods (*c.*5000–1200 BC), and was the subject of a major excavation by the British School during 2001–2005. Twenty-seven burials were recovered, most of them from a Middle Bronze Age cemetery (2000–1700 BC) and mostly from shallow earth graves (Cavanagh and Lagia, forthcoming; Cavanagh *et al.* 2007; Lagia *et al.* 2007).

2. DNA TECHNIQUES

The techniques used to extract the DNA and the regime followed in analysing the results are described in detail in Bouwman *et al.* (2008) and Chilvers *et al.* (2008). Briefly, surface contamination, including DNA deposited on the bones by excavators and curators, was reduced by removing the outer 1–2 mm of each bone sample with a sterile scalpel and irradiating with UV. Approximately 0.5 g was then removed from the core of each bone and any DNA present in the sample extracted by soaking the powder in a buffer. The DNA was then concentrated and an aliquot tested using a series of PCRs (up to 34 for each specimen) designed to amplify diagnostic regions of the mitochondrial and nuclear genomes. The mitochondrial loci that were studied were the ones containing mutations that enable mitochondrial haplogroups to be assigned, these haplogroups revealing possible maternal relationships as the mitochondrial DNA (mtDNA) is inherited solely through the female line. The nuclear loci included many of the variable sites typed by forensic scientists in order to construct genetic profiles from which both maternal and paternal relationships can be inferred.

3. ANCIENT DNA REGIME

We carried out the work in accordance with the standard criteria of authenticity for aDNA research (Cooper and Poinar 2000) as far as was possible. To avoid cross-contamination with DNA from previous experiments, extractions and PCRs for the Nea Nikomedia, Lerna, and Karaviádena specimens were set up in laminar flow cabinets in physically isolated labs, and those for the Antron, Mycenae and Kouphovouno specimens were set up in similar labs but

each with an ultrafiltered air supply, with specimens handled and extractions prepared within a biological safety cabinet, and PCRs set up within a laminar flow hood. All extractions were accompanied by negative controls in which the entire extraction procedure was performed without bone material, and all PCRs were accompanied by negative controls containing water instead of DNA extract. Ancient DNA molecules become broken into fragments during diagenesis and hence are shorter than modern contaminants, and therefore the lengths of the template molecules in all extracts giving positive PCRs were assessed to ensure that they fell in the anticipated range. To confirm the identity of a PCR product, the DNA was cloned before sequencing, as this procedure enables mixed products (e.g. specimens containing both aDNA and modern contaminants) to be identified, and also enables aDNA sequences to be recognised by virtue of the chemical damage they have undergone during diagenesis. Because of the small amounts of material that were available, it was not possible to carry out some other checks that ideally would have been performed. It was not possible to perform replicate extractions for all skeletons, nor was it possible to divide the bone samples so that portions could be sent to a second lab for independent testing, and, similarly, there was insufficient material to carry out tests aimed at determining the overall level of biomolecular preservation in the specimens, such as measurements of collagen content. Corroboration of the human results could not be sought through study of associated animal remains, as no animal remains were available. As mentioned above, we removed the outer 1–2 mm of each bone prior to preparation of extracts. We have shown that even after extensive handling most of the contaminating DNA in a bone resides in the outer 1–2 mm (Bouwman *et al.* 2006), and that very little redistribution occurs if the bone is washed as in standard archaeological practice (M.M. Mundee, A.S. Bowman and T.A. Brown, work in progress).

Results

The results are summarized in TABLE 2. No evidence of aDNA was obtained with any of the specimens from Nea Nicomedia, Lerna, Karaviádena, Antron Grave Circle A or Mycenae Grave Circle A. With all but one specimen from these sites, PCRs failed to give any products. The exception was sample ZK8 from Karaviádena, which gave products of the correct size with one of the mtDNA PCRs and with a PCR directed at a sex-identifying region of the nuclear DNA. However, the sequence of the mtDNA product was identical with that of E.R.Chilvers, who studied this specimen, and further examination showed that the DNA present was >425 bp, longer than most genuine aDNA molecules, even those from the best-preserved material (O'Donoghue *et al.* 1996). These results suggest that ZK8 had become contaminated with modern DNA from E.R.Chilvers. The possibility that aDNA was present in these bone extracts but undetectable due to the presence of co-purifying substances that were inhibitory to PCR was tested by 'spiking' PCRs of modern human DNA with bone extracts. These control PCRs was unaffected by addition of any bone extract, indicating that inhibitory substances were absent.

The results with the three specimens from Antron Grave Circle B were inconsistent but could possibly indicate the presence of aDNA. Although mtDNA could not be detected, two of the nuclear PCRs gave positive results with extracts of specimens BII and BIII, and a range of positive results were obtained after nuclear PCRs with specimen BV. Replicate PCRs did not, however, give reproducible results and in general the yields of DNA were weak.

TABLE 2. Summary of results.

Site	PCRs attempted with each specimen[a]	Evidence for aDNA
Nea Nicomedia	MtD (2), MtH (2), GA (2)	None
Lerna	MtD (2), MtH (2), GA (2)	None
Karaviádena	MtD (2), MtH (2), GA (2)	None
Antron Grave Circle A	MtC (2), D2S11338 (2), D5S818, D10S1248, D14S1434, D16S539 (2), D18S51 (2), D22S1045, FGA (2), THO1 B (2), DYS426, M35, GA (2), MB (2)	None
Antron Grave Circle B	MtC (2), D2S11338 (2), D5S818, D10S1248, D14S1434, D16S539 (2), D18S51 (2), D22S1045, FGA (2), THO1 B (2), DYS426, M35, GA (2), MB (2)	No evidence of mtDNA. Inconsistent results for nuclear DNA in all three bones studied.
Mycenae Grave Circle A	MtA (2), MtG (2), MtC(2), MtF, MtD (2), MtW, MtV, CD4, D1S656, D2S1338, D3S1358 (2), D5S818, D6S366, D8S535, D8S1179 (2), D10S1248, D10S2325 (2), D14S1434, D16S539, D18S51, D22S1045, FGA, THO1 A (2), THO1 B, VWA (2), DYS389, DYS391, DYS393, DYS426 (2), DYS460 (2), M35, M173 (2), GA (2), MB	None
Mycenae Grave Circle B	MtA, MtG, MtC, MtF, MtD, MtW, MtV (2), CD4 (2), D1S656, D2S1338, D3S1358 (2), D5S818, D6S366, D8S535, D8S1179, D10S1248, D10S2325 (2), D14S1434, D16S539, D18S51, D22S1045, FGA, THO1 A, THO1 B, VWA (2), DYS389, DYS391, DYS393, DYS426, DYS460 (2), M35, M173, GA, MB	mtDNA in Γ55, Γ58, Z59 and A62.
Kouphovouno	MtC (3), D2S1338, D10S1248, D14S1434, D16S539, D18S51, D22S1045, FGA, THO1 B, GA (3), MB	mtDNA and/or nuclear DNA in 7 bones.

[a] Numbers in brackets indicate PCRs that were carried out more than once with each specimen.

Nuclear DNA was occasionally detected in specimens from Mycenae Grave Circle B, but too sporadically for the results to be authenticated. With PCRs directed at mtDNA, 18 of the 22 samples never gave a PCR product of the correct size, or if they did then that product was considered to be non-endogenous to the sample because it was accompanied by contaminated negative controls, was entirely made up of sequences containing an unusual mutation possessed by A.S. Bouwman, who performed all these extractions and PCRs (we assumed that every sequence containing this mutation was a contaminant derived from A.S. Bouwman), or was not human mtDNA. The other four samples (Γ55, Γ58, Z59, and A62) gave sequences which were considered to derive, at least in part, from ancient DNA. These results are described in detail in the final section of this paper.

The bones we studied from Kouphovouno were excavated during 2001–2 under conditions designed to minimize contamination with modern DNA, and the excavator and A.S.

Bouwman were the only people who handled these bones prior to transfer of samples to the high-containment laboratory at Manchester. The mitochondrial and nuclear DNA features of the excavator and A.S. Bouwman are known. It has been suggested that once all sequences identical to those of individuals who have handled a specimen are excluded, then any sequences that remain are likely to be genuine aDNA (Sampietro *et al.* 2006). On this basis, two of the Kouphovouno specimens (KE009B and KE105) contain mitochondrial aDNA, and six (KE009B, KE173, KE207, KE601, KE706, KE715) contain nuclear aDNA.

Discussion

Validation of aDNA research has been discussed extensively in the literature, with the 'criteria of authenticity' proposed by Cooper and Poinar (2000) considered by many to be the gold standard against which such work should be judged. Sometimes, however, these criteria are difficult to meet because of the realities of biomolecular archaeology, in particular the problems posed by the limited amount of material that is usually available for study. Museum curators are, understandably, unwilling to allow destructive analysis of anything more than very small samples taken from human specimens, and their reluctance is likely to become greater with the growing debate regarding 'ownership' of human archaeological remains. The requirements within the 'criteria of authenticity' for multiple extractions and PCRs to check reproducibility of results, replication of extractions and PCRs in a second lab, and analysis of specimens to assess the overall degree of biomolecular preservation, are reasonable if one is working with sufficient material but are not easy to satisfy if only a gram or so of bone is available. Recognising this problem, Gilbert *et al.* (2005) have recommended that biomolecular archaeologists take a cognitive and self-critical approach to authentication of results, which is what we attempt to do here.

A key component of a cognitive approach to authentication of aDNA detection is a consideration of the age and preservation conditions of the specimens under study and the time that has elapsed since their excavation, and an evaluation of whether these factors make it possible for DNA to have survived. As temperature is the primary determinant of the rate of DNA breakdown, the thermal history of a site can give an indication of the likelihood of aDNA presence in specimens, but such analyses are at best approximate due to difficulties in determining factors such as seasonal temperature fluctuations and the precise conditions in the microenvironment occupied by the buried specimens (Smith *et al.* 2003). However, assessment of the thermal history of a site gives an indication of the age beyond which specimens are unlikely to contain aDNA—placing a large burden of proof on researchers claiming aDNA detections with older material—and helps identify in which specimens aDNA survival is possible, providing a starting point for self-criticism of results. In this context, judgment of the authenticity of results at one site is aided by information on the extent of DNA survival at other sites within the same geographical region and hence likely to be of similar thermal ages. Our main focus has been on Grave Circle B at Mycenae, whose thermal age is right on the limit for aDNA preservation. To aid in assessment of the DNA detections that we made at Grave Circle B, we therefore surveyed aDNA survival at various other sites in Greece and Crete, from the Neolithic and Bronze Age, sites whose thermal histories also place them at the very limits of expected survival time for aDNA.

We found possible evidence for aDNA at three of the eight sites that we studied. At Antron

Grave Circle B we detected nuclear but not mitochondrial DNA in each of the three skeletons that we tested. These results were inconsistent with replicate PCRs failing to give reproducible results. The fact that only nuclear DNA could be detected is worrying, as mtDNA is present in a much higher copy number and hence rarely undetectable if genuine nuclear aDNA is present. On balance, we believe that these results are due to contamination of the bones with modern DNA from previous PCR experiments carried out in the laboratory. If the results do indicate the presence of aDNA in these specimens, then that aDNA is very poorly preserved and unlikely to yield useful information. At Mycenae Grave Circle B we obtained evidence for mitochondrial aDNA in four of the 22 skeletons that we studied. A full authentication of these results appears in the scientific report of our Mycenae study (Bouwman *et al.* 2008), and the archaeological implications of the aDNA sequences as the final section of this article. At Kouphovouno we also obtained evidence for aDNA that, subject to more detailed assessment, we believe to be genuine because the genetic features of the aDNA differ from those of the only two individuals who could have contaminated the bone samples.

Equally important are the negative results that we obtained. We have no evidence whatsoever of aDNA in specimens from Nea Nicomedia, Lerna, Karaviádena, or Mycenae Grave Circle A. For the specimens from Nea Nicomedia and for Lerna no. 220 this result is far from surprising because at 7000–8000 years these bones are substantially older than the expected limit (3600 years) for aDNA survival in Greece based on calculations of thermal age (Chilvers 2004). The younger specimens from Lerna are dated to 2050–1675 BC and hence closer to the 3600 year age limit, but the marshy conditions that have prevailed in the vicinity of Lerna for at least part of the period that these skeletons have been buried suggests a relatively high moisture content likely to promote DNA degradation. While these conditions rendered it more likely that the ancient inhabitants of Lerna suffered from malaria (and the bone evidence suggested that anaemia was common), it vitiated the hopes of being able to find the aDNA signatures of the malaria parasite and the globin gene mutations associated with genetic thalassaemia (Chilvers 2004).

The specimens from Karaviádena (2000–1700 BC) had previously been sampled in 2001 at Manchester by Elizabeth Chilvers (neé Stuckey) as part of Arnott's study of malaria in the prehistoric Aegean, and the negative results that we report here derive from that study (Arnott and Stuckey 2003; Arnott and Morgan-Forster in press). Both these bones and those from Mycenae Grave Circle A (1600–1500 BC) are close to the thermal age limit and hence possibly expected to show some indication of aDNA survival. However, those from Karaviádena were poorly preserved at the time of excavation, being highly fragmented, suggesting that overall biomolecular preservation might be poor. The Mycenae Grave Circle A bones, excavated in 1876–7, have been housed in museums for 130 years, and it is now clear that aDNA breakdown accelerates after excavation of bones (Pruvost *et al.* 2007): thus any aDNA present in the Mycenae bones when Schliemann and Stamatakis discovered them will almost certainly have degraded during the intervening decades.

We conclude that, although aDNA might be present in some skeletons from later centuries of the Greek Bronze Age, it is not commonly present in Greek material from this period and is likely to be absent from older material. In reaching this conclusion, we used optimized PCR systems in order to maximize our chances of detecting aDNA if it was present, but we also used an ultraclean facility and took scrupulous care to remove surface contamination from the bone samples, to prevent cross-contamination with PCR products from previous experiments,

and to identify contamination that remained. We also confirmed that negative results were not due to inhibition of PCRs by substances co-purifying with aDNA. We therefore believe that all putative detections of aDNA from the Neolithic and Bronze Age periods of Eastern Mediterranean prehistory require convincing authentication, whether through self-criticism over results or through adherence to criteria of authenticity.

Grave Circle B at Mycenae

Whether a group of skeletons buried in proximity to one another represents the members of a single family can be a key question when human remains are excavated at archaeological sites of any age. Our work at Mycenae was conceived as a search for kinship among the people buried in Grave Circle B. The graves in this circle appear to have been laid out in three groups in the south-east, north-west, and north-east sectors of the circle, with a fourth group comprising two graves (E and Γ) just east of the centre. They were named by the excavators with the letters of the Greek alphabet to distinguish them from those in Circle A which had been given Roman numerals; later Angel identified the individual skeletons with Arabic numerals in the order in which he studied them. Archaeologically one could only guess at what relationship, if any, the occupants of the four groups of graves might have to each other: did each group represent different families, or just different branches of the same family? Facial reconstruction had already identified three distinct facial types among the seven skulls that could be reconstructed, which we thought might represent different family groups (Prag *et al.* 1995): Γ55, Γ58, and A62 all had heart-shaped faces with wide-set cheekbones and eyes, and small, rather delicate features; Γ51 and Z59 had long faces with high foreheads, lantern jaws, and narrow features, while B52 had a large beaky face in a small head, and probably represents a third type or family. Finally, Σ131 had something in common with both the first two types. In terms of relative dating, these individuals covered the whole period of use of the grave circle (*c.*1675–1550 BC): Z59 and Σ131 were buried early in the circle's use, B 52 was 'early middle', and A 62 along with the three individuals in Grave Γ were all late. The layout of the graves and the kinship connections suggested by facial reconstruction are shown in FIG. 2.

Ancient DNA has been used to study such relationships in a historic context (Gill *et al.* 1994; Gerstenberger *et al.* 1999; Dudar *et al.* 2003; Gilbert *et al.* 2005), and so it was introduced here to test or to support the results suggested by facial reconstruction after a pilot project to confirm the survival of DNA in the bones (Brown *et al.* 2000). Altogether we tested 22 of the skeletons from Grave Circle B, including all those for which facial reconstructions had been carried out, except for Σ131: in this case it was no longer possible to identify the associated post-cranial bones in the Nauplia Museum and the skull itself was in too good condition to permit any intrusive sampling, so to our great regret it could not be tested for DNA. Our experiences with specimens from the other sites that we studied warned us that at best we could expect to detect DNA in only a few of these skeletons, and this turned out to be the case, with 18 of the Grave Circle B inhabitants giving entirely negative results. The four other skeletons yielded evidence for mitochondrial but not nuclear DNA. These four skeletons were Γ55, Γ58, Z59, and A62. The fact that facial reconstructions were available for each of these is perhaps not just a fortunate coincidence as the reconstructions had been performed on the best-preserved skulls, which one might expect to be from the skeletons

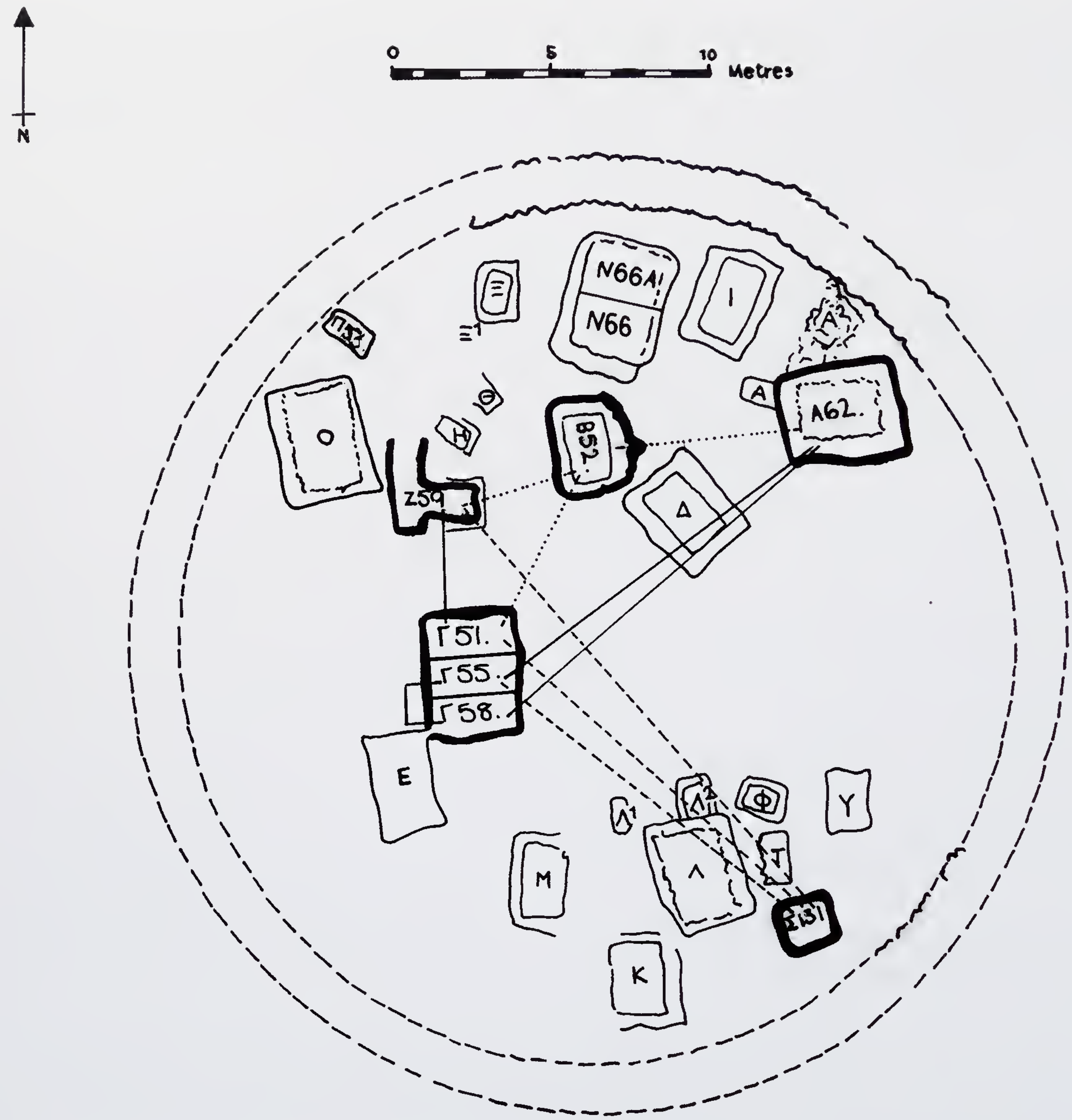

FIG. 2. Plan of Grave Circle B showing kinship connections between graves based on facial reconstructions. Solid lines indicate probable links, broken lines possible links, and dotted lines tentative links.

displaying the best overall preservation and hence the greatest likelihood of containing ancient DNA. The DNA sequences of two of these individuals, Γ55 and Γ58, were identical, but different from that of Z59. With A62 the DNA was very poorly preserved, but from the limited information that we could obtain we were able to establish that its sequence was different again, representing a third class. Why do we have confidence that these detections are of genuine aDNA and not modern contamination? First, there is the information gained from other sites suggesting that aDNA can, under favourable circumstances, survive in material from the Greek Bronze Age. Second, from the identity of the sequences we can

exclude the possibility that they derive from laboratory contamination that occurred after we took our samples. Of course, the bones had been handled prior to our sampling and contamination might have occurred then. Grave Circle B was excavated in 1952–4, using the procedures current at that time and hence without precautions to prevent DNA contamination. We established, however, that since excavation the bones had not been extensively handled, except by Dr J.L. Angel and his two assistants, who carried out the osteological examination in 1954. We therefore surmise that extensive contamination by multiple individuals is unlikely. The fact that three different DNA sequences were obtained from the four skeletons therefore becomes important. We argue that the DNA that we have identified could be modern contamination, if: (i) Γ55 and Γ58 were handled by one or more individuals who did not handle, or at least did not contaminate, any of the other 20 specimens that we studied; (ii) Z59 was handled by a different individual who did not contaminate any of the other 21 bones; and (iii) A62 was similarly handled by another different individual who did not contaminate any of the other 21 bones. This scenario is *possible* but we consider the alternative explanation, that these DNAs are ancient in origin, to be *more likely* (Bouwman *et al.* 2008).

As the tests only yielded data for the mitochondrial DNA, we could infer only the maternal relationships and nothing through the male line. Γ55 and Γ58 could share a maternal relationship. There seems little doubt that Γ58 is a woman: even before the DNA evidence, Angel had noted that although she was tall and strongly built, 'browridges likewise agree with the markedly female true pelvis (birth canal) and pelvis in showing female sex' (1973b, 381 and table 1). Interestingly, although Γ55 was identified as male by both Mylonas and Angel on the grounds of grave assemblage and the skeletal remains respectively, the first round of DNA analyses suggested that this might possibly be a female skeleton, although this was later rejected on the grounds that the female DNA results were less certain and the repeat test proved unsuccessful (Mylonas 1973, i. 46–7; Angel 1973*b*, 379–80 and table 1; Brown *et al.* 2000, 117 and table 1). Many of the graves in both circles contain multiple burials made over a period of time, and the sequence in Grave Γ seems to have been first an unidentified individual (probably male), then Γ58 after an interval long enough for the first skeleton to have become completely disarticulated, and finally Γ55 and Γ51 (Angel 1973*b*, 381; Mylonas 1973, i. 48–9). The fact that Γ58's skeleton was still well articulated suggests that she was buried only a few months before Γ55 and his companion Γ51; there is no evidence from any of the other burials to suggest the use of a shroud that would have kept her skeleton together after the connective tissue had decomposed.

Γ58 and first Γ55 were also close in age: Angel and Musgrave both reckon that he was probably around 33 and she was perhaps 36 years old at death (Angel 1973*b*, 379–81; Musgrave in Prag *et al.* 1995, 132–3). Therefore not mother and son; the simplest interpretation is that they were brother and sister, but they could equally be cousins whose mothers were sisters, or second cousins whose maternal grandmothers were sisters, and so on. It is of course possible that they are unrelated but just by chance have the same mitochondrial DNA, but as their particular DNA occurs in only approximately 5% of Europeans today, it is much more likely that they are related in one of the ways described.

The aDNA evidence tells us that Z59 does not have any maternal relationship with Γ55 or Γ58. He is not a full brother of Γ55 or Γ58 nor the son of Γ58. We cannot say anything about his paternal line. So, for example, he could in theory share a father with Γ55 and/or Γ58 but

have a different mother, he could be the father of one or both, or he could be Γ55's son by someone other than Γ58, but our data tell us nothing on this score. The facial evidence suggests a close relationship with Γ51, though the two men were buried in different parts of the grave circle and are maybe three generations apart, but there are no DNA results to help us. The fact that Γ51 was given a relatively poor burial next to two very rich people in this late grave may suggest a shift in family status and relationships.

The same conclusions apply for A62. He is the one for whom the DNA results are the least secure: according to the available DNA data he has no maternal relationship with Γ55, Γ58, or Z59, although he shares some facial features with Γ55 and Γ58 such as the widely set eyes and cheekbones and the angle of cheek to chin. He was probably in his mid-twenties when he died, a little earlier than Γ55 and Z59 and buried in another part of the Grave Circle. The ages at death and burial dates are too close for him to have been their father, but it is always possible that he was a paternal cousin. We have already suggested elsewhere that the central position of Grave Γ—probably the latest in the circle—suggests some kind of rapprochement or coming together of different branches of the family or of different families (Prag *et al.* 1995, 128–9; Prag and Neave 1999, 141–2).

This may at first seem a rather thin result in the light of the effort that has been put into it, and it is true that it illustrates the difficulty of applying this type of analysis to archaeological remains which have been out of the ground for a long time and in which aDNA is therefore generally poorly preserved and the problems caused by contamination with modern DNA more acute. Nonetheless, we have shown that when hypotheses about kinship can be constructed from existing evidence then the limited aDNA data obtainable from archaeological remains can be used to test those hypotheses and advance understanding. Angel reckoned that of the 21 adults buried in Grave Circle B whose sex could be identified, 16 were male and only 5 female, and he goes on to what one can best describe as a *jeu d'esprit* in speculating about the possible fecundity of Mycenaean rulers and polygamous marriage customs of the period (1973*b*, 389–90). The truth is that by the very nature of this prehistoric and preliterate period we know very little about social relations; that was after all one of the starting-points of this project. So far we have no evidence of brother–sister marriage at this time and place and the discovery of a close kinship between Γ55 and Γ58 does not change that situation significantly. If this was indeed a sibling marriage then it was presumably made possible by Γ58's high birth, but we are left to conjecture whether she was buried in this high-status and male-dominated grave circle because of a marital connection that was linked to her high birth, or because she held a position of authority by right of birth alone.

DNA analysis has thus enabled us to glimpse factors contributing to the organization of the higher echelons of society at the beginning of the Mycenaean age. And for the archaeological scientist this project has pointed the way for future work: the results from Kouphovouno make it very clear that where the samples are taken from freshly excavated bone and under conditions that allow as little contamination as possible, there is indeed much to be learned about the people whose story we are trying to uncover. That, surely, is a great step forward. We like to think that the Mycenaeans—especially Γ58—would have been pleased too.

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CASTING FINGER RINGS IN MYCENAEAN TIMES: TWO UNPUBLISHED MOULDS AT THE NATIONAL ARCHAEOLOGICAL MUSEUM, ATHENS[1]

MYCENAEAN signet rings have already attracted much scholarly interest. Yannis Sakellarakis (1981) has worked extensively on their moulds, whereas Agni Xenaki-Sakellariou (1989), John Younger (1984), Walter Müller (2003) and others (e.g. Ogden 1982, Pini 1983; Tournavitou 1997, Evely 2000) have dealt with chronological, technological, and stylistic aspects of the actual finger rings. The aim of this article is to present two moulds recently recorded in the storerooms of the Prehistoric Collection of the National Archaeological Museum, Athens, and to contribute some thoughts on the casting technique used in the manufacture of finger rings and the type of finger rings produced with these moulds.

DESCRIPTION

1. INV. NO. NAM 17976

Dimensions: L. (max.) 0.027 m, H. 0.016 m, D. (hoop). 0.015 m, half bezel 0.012 × 0.013 m.

Semi-cylindrical part of a stone mould, made of a reddish stone, perhaps bauxite. One side (FIG. 1 *a*) features a longitudinal central groove flanked by two holes; the second (FIG. 1 *b*) bears the negative of half an ellipsoid bezel and a hole on the edge; the third (FIG. 1 *c*) carries the almost complete negative of the hoop, an inlet funnel, and two holes, one of them now partially preserved, on either side of the funnel.

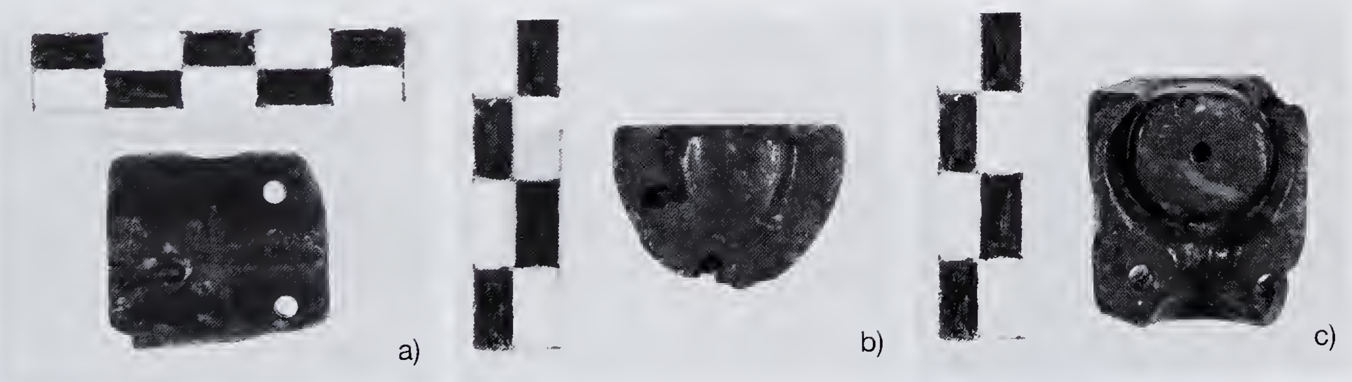

FIG. 1. Mould inv. no. 17976; *a*) main side; *b*) cast of the ellipsoid bezel; *c*) upper side.

This mould was recently discovered among unrecorded material dating primarily to the LH III A–B periods (Phi and Psi-type figurine fragments, buttons and spindle whorls, a potsherd with figurative painted decoration). The assemblage, kept in the storeroom of the Museum's Prehistoric Collection, is without

[1] We should like to thank Dr Lena Papazoglou-Manioudaki, Head of the Prehistoric Collection of the National Archaeological Museum, and our colleagues Constantinos Paschalidis, Pandelis Pheleris, Gerasimos Makris, Eleni Morati and Irini Miari for all their help. We are greatly indebted to the craft designer Akis Goumas for his invaluable advice on technological matters and to Dr Maria Xanthopoulou for helping with the English text. We should also like to thank the two anonymous referees for their suggestions.

provenance and also includes much later artefacts, such as a Roman torso. It may originate from the citadel of Mycenae, where similar moulds have been found. A stone chisel, a fragment of Egyptian blue, and two glass beads suggest the activity of artisans.

The material, bauxite, is already known from another ring mould (NAM inv. no. 1021) on display in the Mycenaean Gallery of the National Archaeological Museum (FIG. 2). The circles for the hoop were drawn with a compass, as indicated by the hole in the centre. The holes on the edges served to dovetail the mould with its other half.

FIG. 2. Mould inv. no. 1021 from the Acropolis of Mycenae.

2. INV. NO. NAM 18128

Dimensions: 0.04 × 0.035 m, D. (hoop, both sides) 0.025 m, half-bezel 0.006 × 0.008 m.

Rectangular part of a mould, made of dark stone, probably steatite. One side features the almost complete circle of a hoop (FIG. 3 *a*). On the narrow, vertical side, two curved incisions form an incomplete (possibly for lack of space) ellipse. The ring ends in an inlet funnel. On the other side, the mould's surface is very worn, with an almost complete hoop of the same size as the previous one, and a hole. On the narrow side, next to the hoop, is half an ellipsoid bezel.

This fragment was also found in the storeroom of the Prehistoric Collection of the National Archaeological Museum with the indications 'Mycenae' and 'Mycenae 1904'. Unfortunately, Christos Tsountas who excavated at Mycenae during that period, does not mention the mould in his reports. The bezel's negative on one side (FIG. 3 *b*) was probably left unfinished because the craftsman miscalculated its final dimensions. But even the finished bezel on the opposite side (FIG. 3 *c*) seems rather small for the size of the hoop, suggesting that the mould might be the unsuccessful attempt of an apprentice.

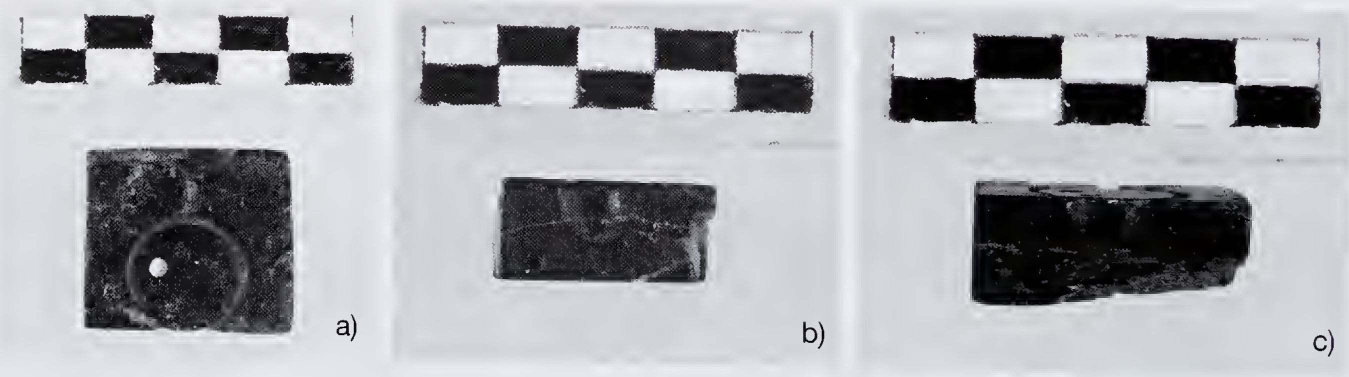

FIG. 3. Mould inv. no. 18128; *a*) main side; *b*) narrow side, the finished ellipse of the bezel; *c*) narrow side, the unfinished ellipse of the bezel.

Discussion

Mycenaean jewellery moulds are relatively rare (see Hughes-Brock 2008 for the most recent list), hence the importance of these two examples. Several were used for the manufacture of plain hoops, like the one in the Thebes Archaeological Museum (inv. No. 1477; Demakopoulou 1974, 166–7, figs. 1–3), others for bezel rings, like these two. Similar moulds come from Mycenae (NAM inv. no. 1021, already mentioned), Poros (Herakleion Archaeological Museum, inv. nos. 2456 and 2465), Malia (Herakleion Archaeological

a)

b)

FIG. 4. Mould from Eleusis (inv. no. 4110, Eleusis Archaeological Museum) *a*) hoop cast; *b*) bezel cast.

Museum, inv. no. 2477), Eleusis (Eleusis Archaeological Museum inv. no. 4110; FIG. 4 *a*, Mylonas 1956, 80; 1975, A 306, pls. 64, 65 *a*) and Enkomi, Cyprus, now in the British Museum (FIG. 5). They were used to cast rings with ellipsoid bezels, of which at least some belonged to the elite class of signet rings.

The study of Mycenaean bezel rings has shown that most of them have a beaten hoop with a hollow or solid bezel soldered onto it (Xenaki-Sakellariou 1989, 326). Solid-cast bezel rings necessitated a larger quantity of precious material and a much higher degree of technical ability. Like their hollow counterparts, solid-cast rings usually had the decorative motif either stamped, by means of a tool with a shaped edge, or punched and engraved on the bezel at a later stage (Sakellarakis 1981, 170). Moulds with motifs for the decoration of the bezel do exist, however; some for the bezel alone (for examples from Crete see Sakellarakis 1981, figs. 1–2) and some for the hoop and bezel (FIG. 4 *b*), as is the case with the Eleusis mould inv. no. 4110 mentioned earlier.

Ultrasound analysis by Müller (2003, especially 476 n. 6; 2005) of thirty Mycenaean finger rings from the Herakleion Archaeological Museum (Crete), National Archaeological Museum (Athens), and Olympia Archaeological Museum, showed that only one, namely NAM inv. n. 3178 from Chamber Tomb 90 at Mycenae (Sakellariou 1965, no. 125) was solid cast in one piece (FIGS. 6 *a*–6 *b*).

Müller's analysis further showed that the bezel and hoop of signet rings until recently believed to be solid cast, namely NAM 992 and 993 from the Acropolis of Mycenae and NAM 8084 from Perati, were cast separately. Considering the rarity of solid-cast finger rings, whether signet rings or not, the number of known moulds is relatively large. Hence the hypothesis

FIG. 5. Mould from Enkomi, Cyprus (courtesy of the British Museum).

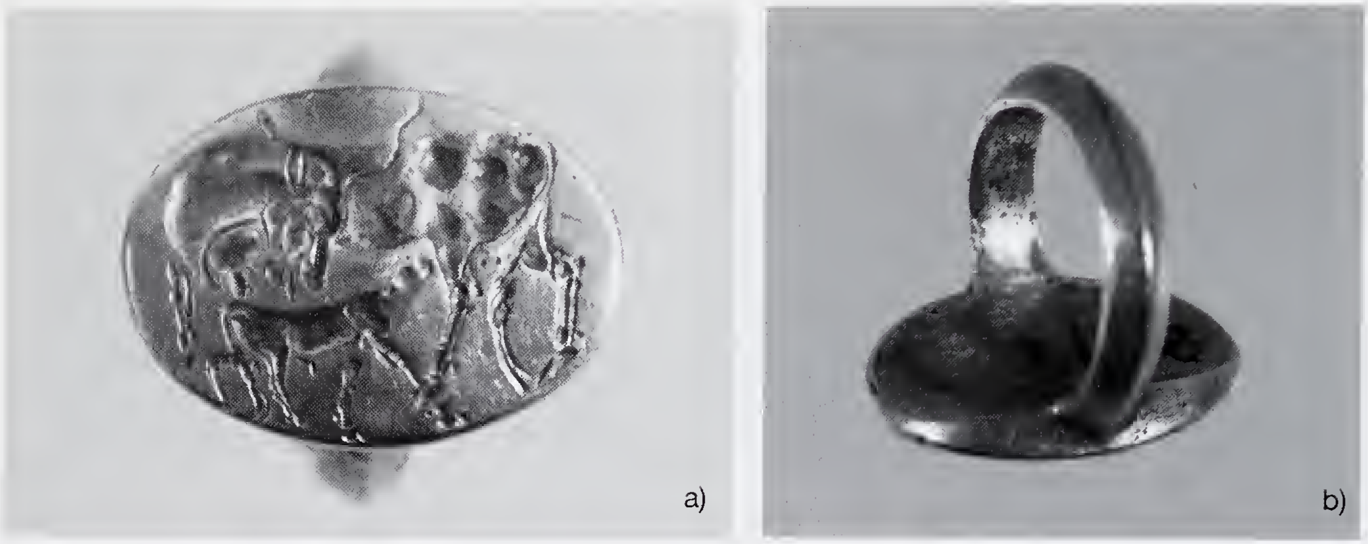

FIG. 6. Signet ring inv. no. 3178; *a*) bezel; *b*) hoop of triangular section, detail of interior.

that these moulds were used to hammer gold plate into shape, either directly or with the use of an intermediate layer of lead (Sakellarakis 1981, 172). They may also have been used to cast finger rings using other materials, such as silver, a metal that oxidizes very easily and quickly, of which no examples have yet been found (Konstantinidi 2001, 6).

It has also been argued that the stones used for Mycenaean moulds are relatively soft in order to facilitate engraving, and that they could not have been used for casting metal (Higgins 1980, 18). The mould for plain rings from Thebes preserves traces of molten metal on one side (Demakopoulou 1974, 166–7) although one could argue that these are the remains of the stamping process by means of a tool mentioned earlier. Normally, a stone mould has to be heated prior to casting, otherwise the metal will immediately cool the moment it comes into contact with it, so preventing the mould from being filled. Experiments, however, showed that steatite, the stone used for most of the moulds, can be heated to 1100° C and suffer only a very small percentage of shrinkage (Evely 1992, 29–30) and so be able to tolerate the molten gold (MP of 1063 °C, or lower, when mixed with copper/silver).

If the moulds were not used for casting, they may have been used to make wax models, themselves then used in the lost wax technique.[2] Because of its fluidity, wax makes perfect casts and reproduces the slightest surface detail, thus saving the craftsman time and labour (Untracht 1975, 351). Chunks of beeswax have been found on sites like Kommos (Shaw and Shaw 1995, 497–523), sometimes together with pieces of resin, as part of workshop equipment. The mixture of these two materials is still used today in this technique (Untracht 1975, 358), in order to improve the quality of the model. Furthermore, there is evidence that the lost wax technique was already known in Egypt and the Levant during that period.[3]

[2] For the same reason it has been suggested that all Mycenaean jewellery moulds were used for casting glass or faience. Sakellarakis 1981, 172, lists the arguments for both theories.

[3] For the technique of casting solid metal finger rings during the New Kingdom and later, see Andrews 1990, 85–6; for the use of the technique in Egypt and the Levant, see Laviosa 1967, 507–9; for actual wax models, see Noble 1975.

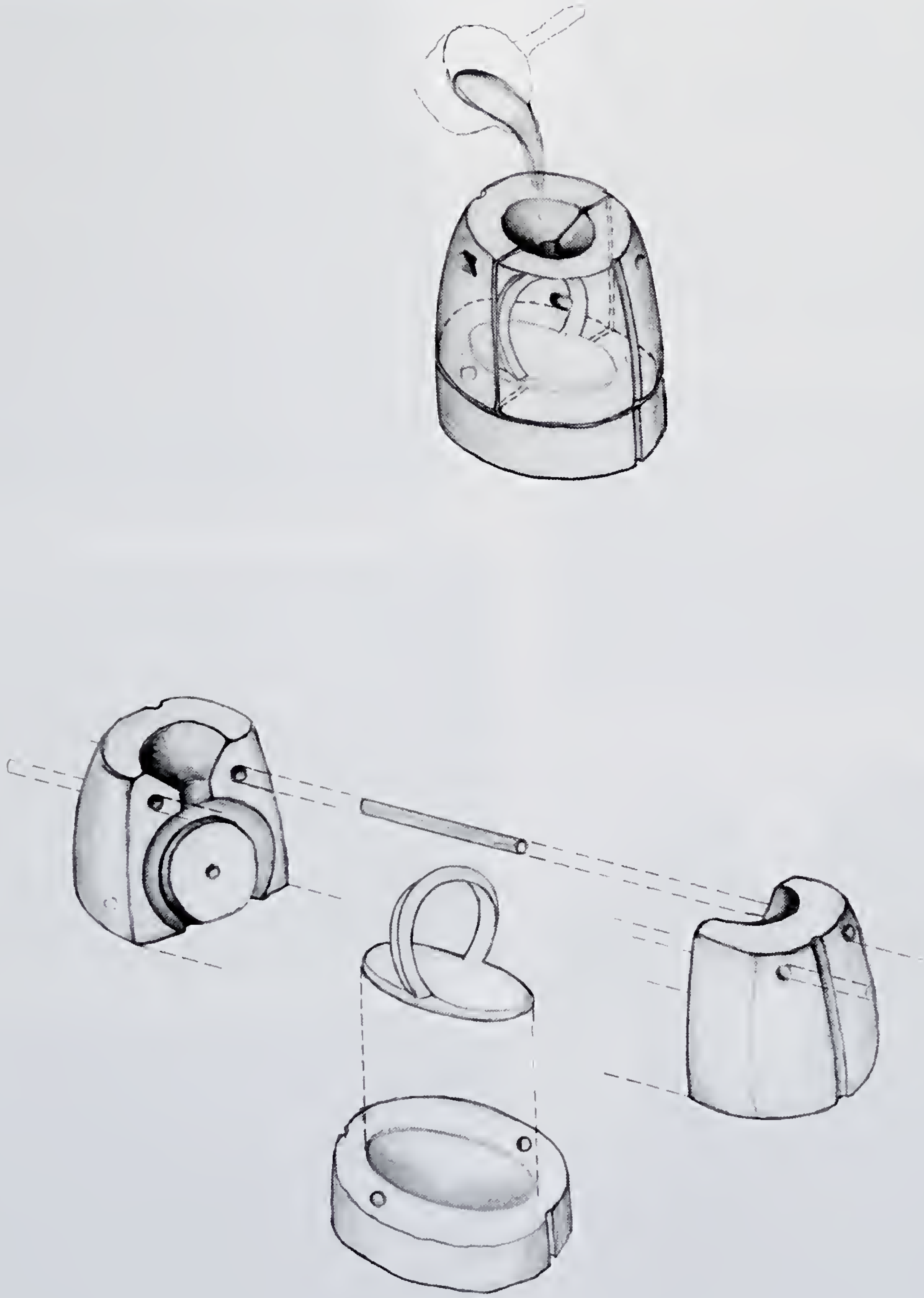

FIG. 7. Drawing of a three-part mould, based on inv. no. 17976.

One of the challenges of casting lies in the difficulty of filling the entire cavity of the mould with molten metal. Today, this is achieved mechanically with the use of centrifugal force by introducing the metal while spinning the mould quickly around its axis (Untracht 1975, 371–2). Centrifugal force is necessary for the metal to fill the entire mould and give an as much accurate reproduction possible of the original piece.

Either way, the construction of bezel finger rings would have necessitated a three-part mould (two parts for the hoop and one for the bezel). Our two examples and mould NAM 1021 correspond to one-third of the mould that they belonged to. The three parts would clip together (FIG. 7) by means of metal (copper alloy) flat wire and rivets inserted into the preserved holes.

This type of wire is known from Gournia (Crete) (where moulds with the wire still wrapped around them *in situ* were excavated), Menelaion (Sparta), and the Unexplored Mansion at Knossos (see Catling 1984, 218–19 for relevant bibliography). After the parts were fastened together, the metal was poured into the mould and left to cool before the mould was taken apart again, sometimes causing it to break (see break on the edge of NAM inv. no. 17976). The bezel was then either left plain or decorated with punches and other tools.

A third mould, NAM inv. no. 2736 (FIG. 8), was used to cast the bezel; it is rectangular, with two holes at either end for attaching the other two parts. The mould (dimensions of bezel 0.037 × 0.025 m) was discovered during Tsountas' 1890 excavations at the Acropolis of Mycenae. It is kept in the storerooms of the Prehistoric Collection together with two similar, though unfinished pieces, which undoubtedly served the same purpose.

It is noteworthy that the other mould fragments, for casting hoops, bear only one perforation each: this confirms the theory about the way the three parts would be attached to each other. The cast obtained from this mould is plain ellipsoid, of the type seen on signet rings from the Tiryns Treasure (NAM inv. no. 6210) and the cemetery of Perati (NAM inv. no. 9047).

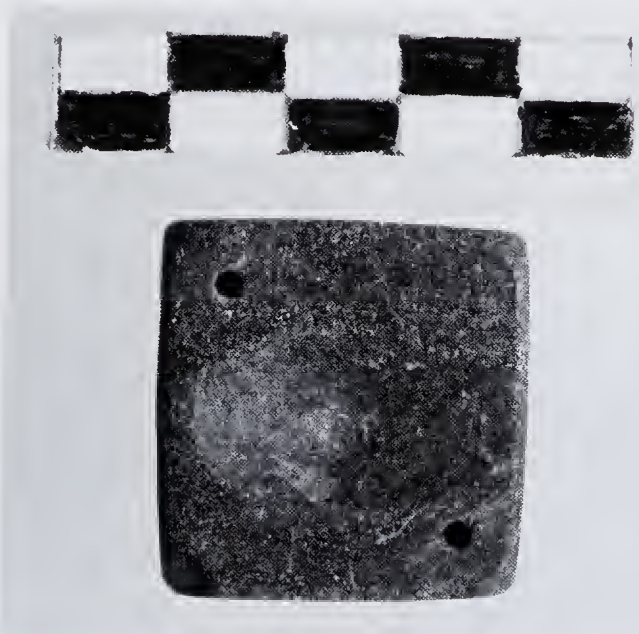

FIG. 8. Mould inv. no. 2736 for the cast of a bezel.

Casts of the two moulds were made in order to provide evidence for the type of the finished finger rings (FIG. 9 *a–g*). The model was made using a silicon-based material (polyvinylsiloxan) in the Metals Laboratory of the National Archaeological Museum. An interesting feature is the hoop's triangular section, which was obtained by carving the stone with a sharp tool held at an angle. It is possible to suggest that most hoops with a triangular section were cast, as already shown by Müller's analyses. Carving a rounded groove on a mould is more difficult and time-consuming.

Because their manufacture took time and necessitated special skills, stone moulds were probably reused several times. If that was the case, they might not have been used for directly casting metal, as even steatite cannot

FIG. 9. *a–g*) Stages of the cast making for moulds inv. nos. 17976 and 18128.

withstand high temperatures repeatedly. They were rather used for producing wax models. The simulation of the casting procedure by the authors and a team of experts is expected to provide answers to these questions.

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PREHISTORIC LACONIA: A NOTE ON THE LOCATION OF THE SITE OF SOUROUKLA[1]

As his tribute to Hector Catling, William Coulson published a number of Mycenaean sherds, held in the collection of the American School at Athens, from four sites in Laconia: Epidauros Limera, Souroukla, Vaphio, and Amyklai (Coulson 1992). The sherds from Souroukla were collected by Carl Blegen on 21 November 1921, during one of the American School's trips to Laconia. The identifiable sherds from this site included twelve Mycenaean, at least nineteen Middle Helladic and several said to be probably Geometric (Coulson 1992, 89–91 with fig. 26). The site, for which Blegen was given the name Souroukla, was noted by him as a low hill to the west of Skala. Coulson cites the entry in Blegen's diary:

> On the way back [from Monemvasia] we stopped at several places to oxyderk [i.e. take a quick look] for prehistoric sites.
>
> We found one such site just west of the village of Skala on a low green hill to the W. of the road. On the hill are the ruins of a small Byz. church. The hill is surrounded by the streams from a great kephalari which rises at the village of Skala. The name by which the hill is known is Souroukla. I collected a good no. of sherds on the hill—apparently Early Hell. and Middle Hell. and some Myc. as well. Across the swamp and water ca. 200 yards to the north is a small rocky hill which looks like a sort of acropolis. I thought I saw a wall around it but we couldn't cross over to investigate.
>
> Another site somewhat farther to the west on the south side of the road—approximately opposite kilometer post no. 39. This is a fairly high large hill with flat top on which are the ruins of a large rectangular building prob. Turkish or earlier. The hill is ca. 400 yds from the road. Good depth of soil and there may be walls round hill. I picked up a pocketfull of Mycenaean sherds here.
>
> At dusk we drove on to Sparta arriving ca. 7·45 P.M.

Apparently on the advice of Carol Zerner and Guy Sanders, Coulson (1992, 89–91) assumed that Blegen's Souroukla is to be identified as the important site of Ayios Stephanos, explored by Hope Simpson in 1956 (Waterhouse and Hope Simpson 1960, 97–100 with map, fig. 19 on p. 104) and excavated by the British School under Lord William Taylour in 1959 and subsequently (Taylour *et al.* 1972, Taylour 1974, 1975, 1978). The truth, however, is much more interesting than this erroneous assumption; and Coulson has provided us with the means (i.e. the entry in Blegen's diary) for revealing the true identity of Souroukla.

Blegen described Souroukla as 'just west of the village of Skala on a low green hill to the W. of the road.' This implies that it was *close* both to Skala and to the road. Ayios Stephanos, however, is quite a *high* hill, at the east end of a spur (in the background of FIG. 1 *a*), about 4 km south-west of Skala, and only just visible from it. In order to reach the place *by car* from Skala (in late November 1921), Blegen's party would have had to make a difficult detour from the main road (from Monemvasia to Sparta via Skala), using only dirt tracks, through the marsh and over several streams. Whether by car or on foot, such a diversion would have taken

[1] This note is dedicated to the memory of my former colleagues, Helen Waterhouse and Willy Coulson. I again record my debt to the British School at Athens, under whose auspices I was able to work in Laconia. I gratefully acknowledge the continuing support of our Department of Classics, especially the help of our administrative assistant T.M. Smith and of our secretary E. Gunsinger.

FIG. 1. (*a*) Skala: Ayios Nikolaos from the north.

FIG. 1. (*b*) Stephania: Lekas, Panayiotis from the north.

far more time than that required for an 'oxyderk'; and it would surely have constituted a feat worthy of special mention in Blegen's diary. Even in July 1959 our excavation Land Rover, on its daily run between Skala and Ayios Stephanos, twice became stuck in the mud and had to be towed out by tractor.

Fortunately, we do know a site 'just west of the village of Skala' which can be securely identified as Blegen's Souroukla, since it conforms exactly with every detail about the site in his diary. This is the small prehistoric settlement of Skala: Ayios Nikolaos (FIG. 1 *a*) investigated by Helen Waterhouse (née Thomas) before World War II and by me in September 1956 (Waterhouse and Hope Simpson 1960, 94–5 and 1 on map fig. 19). It is on the western outskirts of Skala, and in 1921 it would have been on the *west* side of the (old) road from Skala to Sparta. It is now to the *north* of the (modern) main road in use in 1956, which runs south of the old centre of Skala and is elevated above the plain (formerly part of the Helos marsh) and surrounded by the more recent ribbon development. But in 1921 the road from Monemvasia to Skala ran *through* the old Skala before turning south-west beyond Skala, skirting the north edge of the marsh. In September 1956 I recorded the Ayios Nikolaos site as a low and flat knoll (or hillock), *c.*120 m east to west by *c.*80 m, only about a kilometre west of Skala, between two of the channels leading from the springs of the Vasilopotamos (Blegen's 'great kephalari which rises at the village of Skala'). On this hillock were the ruined remains of a chapel of Ayios Nikolaos (Blegen's 'ruins of a small Byz. church'). (There is no 'great kephalari' at Ayios Stephanos, and the little chapel there is *not* ruined.) Also recorded in my September 1956 field notebook is a 'rocky hill immediately to north which looks bare.' This is clearly the same as Blegen's 'small rocky hill which looks like a sort of acropolis', which he saw (but could not get to) 'across the swamp and water ca. 200 yards to the north'. In 1956 I was able to 'cross over to investigate'. The only sherds were a few (undiagnostic) at its south foot. And the 'wall' that Blegen thought he saw around the hill turned out to be a *lusus naturae* (nature 'imitating' human artefacts). There is no such 'small rocky hill' in the marsh to north of Ayios Stephanos.

After the 'oxyderk' at the Skala site, Blegen and his party continued their return to Sparta. Further confirmation of the identification of Souroukla is provided by the next entry in Blegen's diary, concerning the site 'somewhat farther to the west on the south side of the road', with 'the ruins of a large rectangular building prob. Turkish or earlier', and 'ca. 400 yds from the road'. This is without a doubt Stephania: Lekas, Panayiotis (FIG. 1 *b*). This was in September 1956, also *c.*400 m to south of the road; and thorough examination revealed that it had been a substantial Mycenaean settlement, and with ancient walls (Waterhouse and Hope Simpson 1960, 95–7 and 'Lekas' on map, fig. 19). Blegen says, 'I picked up a pocketfull of Mycenaean sherds here.' Presumably this was the *last* 'oxyderk' of the (late November) day, since the next entry reads, 'at dusk we drove on to Sparta arriving ca. 7·45 P.M.' It is evident, therefore, that Blegen made this particular diversion (to the Lekas site from the main road) hastily, and probably solo. There is no further information concerning the 'pocketfull' of sherds.

From the above it appears that Blegen was the first to discover both Skala: Ayios Nikolaos (*alias* Souroukla) and Stephania: Lekas, Panayiotis. The latter is also very probably the site referred to by Helen Waterhouse in her note, 'Stefania: Professor Blegen tells me he found Mycenaean sherds on a low hill seawards from the village' (Waterhouse 1956, 170 n. 8). Blegen's surface finds from 'Souroukla' are consistent both in quality and quantity with those

found at the site (i.e. at Skala: Ayios Nikolaos) by both Waterhouse and myself. And the 'Souroukla' diagnostic sherds were also of the same dates (i.e. MH and LH III B), with the exception of the sherds described by Coulson as 'probably Geometric' (Coulson 1992, 89 n. 12). They are *not*, however, consistent with the 1956 surface finds at Ayios Stephanos, where the sherds were 'very numerous' (Waterhouse and Hope Simpson 1960, 97) and included many MH, Mycenaean of all periods from LH I to early LH III C, and some EH II (the selected sherds filled a small crate, which of necessity was placed in the roof-rack of the bus from Skala to Athens, en route to the BSA collection).

It must be concluded that Ayios Stephanos was *not* one of the sites investigated by Blegen on 21 November 1921; and he never claimed to have discovered it. The first report of Ayios Stephanos is that of my surface survey in September 1956.

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FEMALE TRIADS ON LACONIAN TERRACOTTA PLAQUES[1]

AMONG the many Archaic and Classical terracotta relief plaques discovered in sanctuary deposits in Laconia, there are several representing three standing females. About thirty come from a large votive deposit excavated half a century ago near the church of Agia Paraskevi in modern Amyklai (Christou 1956, 1960*a*, 1960*b*, 1961) and some more were found nearby in 1998 in a second similar deposit (Themos 1998). The first deposit contained more than 10,000 objects ranging in date from the seventh century BC to the early Hellenistic period. Included were vases of regular and miniature size, terracotta figurines, and hundreds of terracotta relief plaques of the late sixth through to the fourth century BC. In addition to female triads, the plaques bear representations of seated figures, standing couples, warriors, riders, and banqueters. The most popular subject, a seated male figure holding a kantharos and often accompanied by a snake, is iconographically and stylistically related to a series of Laconian stone reliefs, most likely dedicated to various local heroes (Stibbe 1991; Salapata 1993).

Literary, epigraphic, and archaeological evidence associates the deposits with the sanctuary of Agamemnon and Alexandra, who was identified with Cassandra by the local people (Paus. iii. 19. 6; Salapata 2002*b*). The iconography of the plaques, especially the seated figures, is appropriate to the honoured figures. The bearded man depicted in a dignified pose holding a drinking cup and occasionally a staff conforms well to the image of the hero-king of epic, with the snake emphasizing his heroic status. The woman occasionally seated next to him or by herself assumes the role of his consort (Salapata 2002*b*, figs 2–4; ead. 2006, 554 fig. 10).

Many plaques with female triads have been found in other votive deposits in Sparta, containing assemblages similar to that at Amyklai and thus presumably also associated with heroic figures, but whose identity remains unknown: one from Chatzis plot (Steinhauer 1973–4, 291–2), several from unpublished excavations (e.g. Karmoiris plot, Sparta Museum no. 7066; Panagopoulos plot, Sparta Museum nos. 7627, 7434–9) and twenty-three from a votive deposit in the kome of Limnai, significantly in close association with earlier graves (Flouris 1996; 2000, 96–7 pls. 99–103). Finally, a single plaque depicting a female triad was found at the Menelaion near Sparta (Thompson 1908–9, 121, fig. 3. 32; Jenkins 1932–3, 74; pl. 11. 1).

The most common type of Laconian plaques with triads (FIG. 1) depicts identical frontal figures standing side by side. The rendering is very schematic: a lump of clay for the head and a strip for the body, with no arms or feet indicated. On two plaques, one from the Menelaion and the other from Amyklai (FIGS. 2–3), the figures are more detailed, shown as female and clothed. It is thus very likely that the schematic figures were also intended to represent draped females. The females on the plaque from Amyklai shown in FIG. 3 appear to be holding hands, implying they are dancing (six plaques from Panagopoulos plot, Sparta also belong to this type).

[1] I should like to thank A. Villing and the second, anonymous, referee for their very useful suggestions to improve this article. I am grateful to I. Peppa-Papaioannou for providing detailed information on the Voidokilia plaques and to Ch. Flouris for allowing me to read his unpublished dissertation. C.M. Stibbe, B. MacLachlan, and A. Themos have shared their thoughts and knowledge with me.

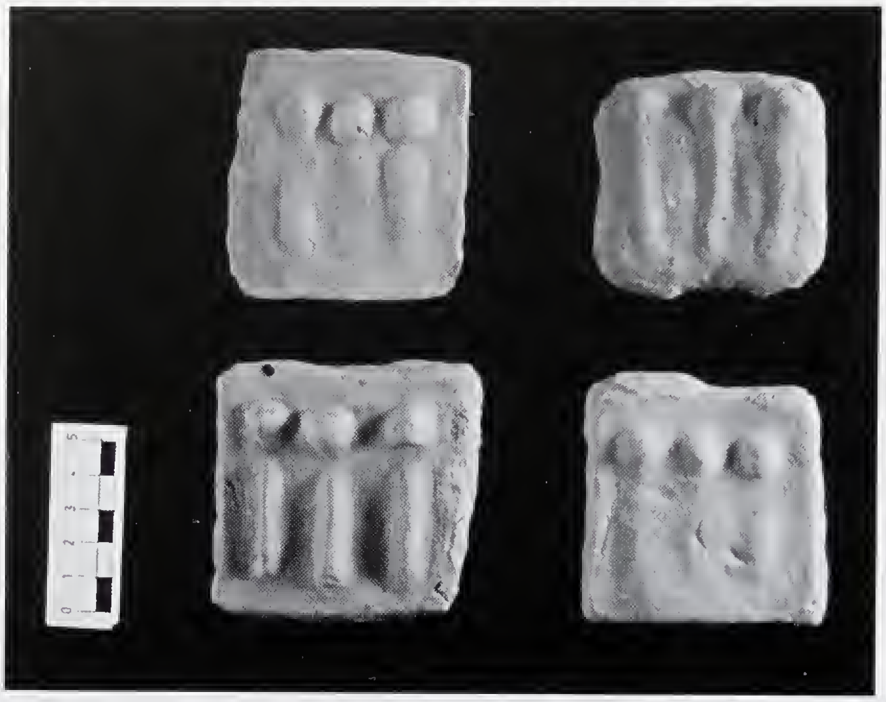

FIG. 1. Terracotta plaques from the sanctuary of Alexandra/Cassandra and Agamemnon, Amyklai: schematic triads. Sparta Museum nos. 6237/15, 6237/10, 6237/14, 6237/6.

FIG. 2. Terracotta plaque from the Menelaion: three female figures (after Thompson 1908–9, 121 fig. 3. 32).

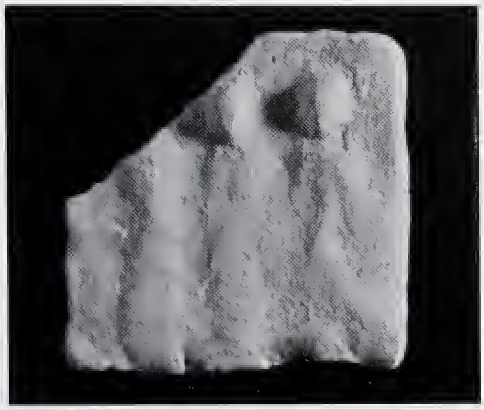

FIG. 3. Terracotta plaque from the sanctuary of Alexandra/Cassandra and Agamemnon, Amyklai: female triad holding hands. Sparta Museum no. 6237/28.

FIG. 4. Terracotta plaque from the sanctuary of Alexandra/Cassandra and Agamemnon, Amyklai: schematic triad with wreaths. Sparta Museum no. 6237/18.

An exceptional plaque, also from Amyklai, depicts three identical females with wreaths in the background (FIG. 4). The figures have their right arm raised while a line extending from the left side of the figure to the right most likely represents the left arm. Two small wreaths are placed in front of the middle and right hand figures. The arms and wreaths were probably a later addition, engraved into a mould that originally belonged to the simple schematic type.

Another Amyklaian plaque shows a taller middle figure (FIG. 5). Exceptionally here the three figures have arms and feet and are wearing long garments rendered in relief outlines. They are depicted frontally but their feet are shown in profile to the left. The closest parallel for this type is a plaque found near Astros in Kynouria (FIG. 6), with all three figures wearing a kind of headdress or wreath, and the middle, taller one rendered in higher relief and provided with rudimentary features.[2] The rendering in relief outlines, the similar size, and the type of clay suggest that the Astros plaque is most likely Laconian, perhaps dedicated by a visiting Spartan.

[2] The plaque was found in a sanctuary (maybe of Apollo) around 400 m north of the village Elliniko (near Astros), possibly identified with ancient Thyrea: Phaklaris 1990, 185–92 esp. p. 189 and pl. 96 δ.

FIG. 5. Terracotta plaque from the sanctuary of Alexandra/Cassandra and Agamemnon, Amyklai: female triad with taller middle figure. Sparta Museum no. 6145/1.

FIG. 6. Terracotta plaque from near Astros, Kynouria: female triad with taller middle figure (after Phaklaris 1990, pl. 96 δ).

Finally, the most interesting type, represented by six fragmentary plaques from Amyklai, depicts three standing frontal figures flanked by four upright snakes (FIG. 7 *a*) (Sparta Museum nos. 6236/1, 6154, and four unnumbered examples). Although no complete examples survive, the composition can be reconstructed with certainty (FIG. 7 *b*). The figures are here provided with a rudimentary hairstyle or a headdress.

The Menelaion plaque (FIG. 2) certainly belongs to the early Archaic period, as indicated by the figures' stiff pose, defined waist, type of coiffure, and 'Archaic smile'. The date of the schematic plaques is uncertain, but based on comparative material from Messenia (for which see below) it probably falls in the fourth century BC.

Iconography

Two interconnected questions are raised in the examination of the iconography of these female triads. The first concerns their number: does their appearance in groups of three

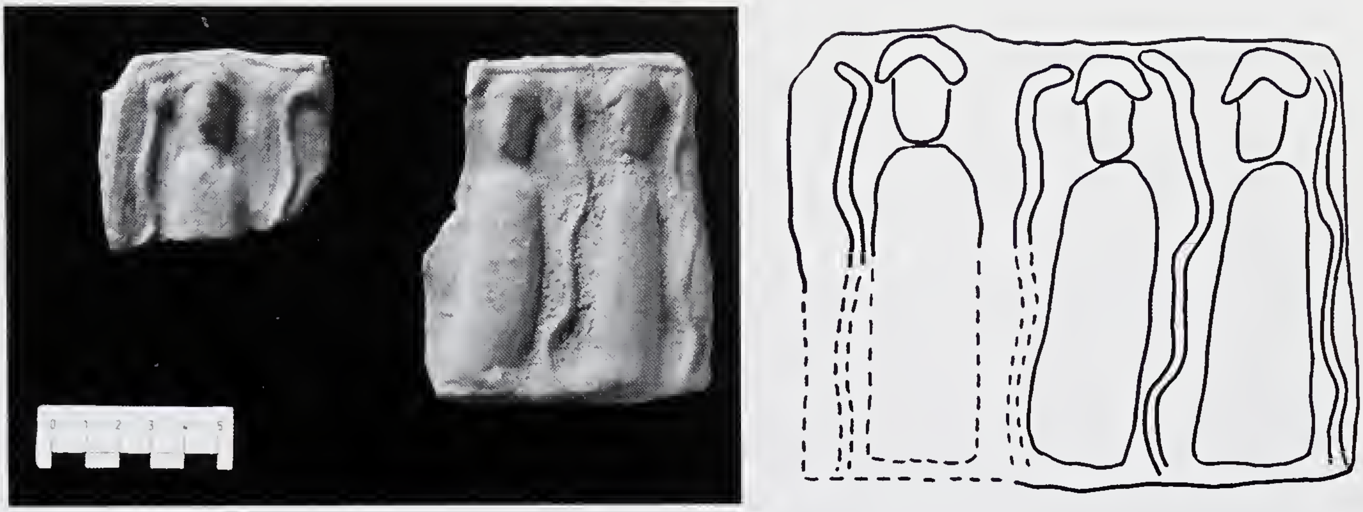

FIG. 7. (*a*) Terracotta plaques from the sanctuary of Alexandra/Cassandra and Agamemnon, Amyklai: female triad flanked by snakes. Sparta Museum nos. 6236/1 and 6154; (*b*) Female triad flanked by snakes: graphic reconstruction.

mean that they are a defined triad or is it just an indication of unlimited plurality, a way to suggest 'many females'? The second question relates to their nature: are they divine or mortal?

The iconographic analysis of the triads should start with a reminder that all terracotta relief plaques were originally enhanced with painted details, of which only traces may remain. Thus in the case of the more schematic figures, features such as arms and attributes could have been added solely in paint, making their identity more specific (Salapata 2002*a*, 21–2). Judging from the more detailed plaques, we may assume that all figures were female and wearing long garments.

FEMALE TRIADS IN GREEK ART

Greek mythology and cult provide us with abundant examples of triads of minor female divinities, with individual members more or less undifferentiated: e.g. the Horai, the Charites, the Hesperides. In Greek art female pluralities, mainly triads, are especially well attested, but many remain anonymous. The oldest example of an identical female triad comes from Crete. It is an early Orientalizing gold ornament from the Idaian cave showing three draped women depicted frontally with arms on the sides and wearing a polos (Blome 1982, 11, 76, fig. 4). Similar triads were particularly popular at the sanctuary on the acropolis of Gortyn, where these figures are naked with one hand on the pubis (e.g. Böhm 1990, 97–9; pl. 37 *a, c*). The nudity, strict frontality, and gesture of the Gortyn figures can be traced to eastern sources,[3] and the iconography may have been introduced to Greece through small, portable votive objects. The examples of draped female figures, with which we are particularly concerned here, seem to be an adaptation of the eastern iconographic scheme to Archaic Greek taste which did not favour the naked female body. It may be significant, therefore, that Laconia, an

[3] For Egyptian examples, see Rizza and Santa Maria Scrinari 1968, 251; for Near Eastern examples, see Böhm 1990, 47–8, 98, 156 (fig. 7 *a–b*).

area with early contacts both with the East and Crete,[4] produced at least one Archaic plaque with a female triad (FIG. 2).

Female triads of identical or very similar figures lacking specific attributes appear on stone reliefs and terracotta plaques of later times (Usener 1903; Hatzisteliou-Price 1971; Larson 2001, 258–67). Such groups are traditionally identified with semi-divine beings, such as the Horai, the Charites, the Moirai, or the Nymphs, all of whom appeared in the plural and tended to form triads. In particular, triads of dancing women are identified with the Charites and more commonly with the Nymphs, in accordance with early popular belief (Hom. *Od.* xii. 316–18; *Cypria* fr. 5 Allen; Schwarzenberg 1966, 1; M. Bell 1981, 92; Kleine 2005, 74).[5] Thus the dancing figures on the Chiaramonti relief, a version of an original of about 470 BC, are identified as the Charites,[6] while the three dancing maidens, usually led by Hermes, on many Attic fourth-century BC votive reliefs, are identified as Nymphs (Fuchs 1962, 242–9; pls. 64–6, 69.1; Kleine 2005, 82–3; Larson 2001, 258–67; fig. 3. 1).[7] In many cases, however, there is nothing more than the gender and number of the figures to suggest their identification with either of these groups.[8] The likelihood of misinterpretation becomes obvious when one considers the early fifth-century BC reliefs flanking the Passage of the Theoroi on Thasos. On one side is Apollo with three Nymphs and on the other Hermes with the three Charites (École française d'Athènes 1968, 37–9; figs. 12, 104; Larson 2001, 170–1). Both Nymphs and Charites are depicted in a similar manner, and would have been indistinguishable without inscriptions. It is clear, therefore, that any specific identification of such a triad would be highly speculative.

Occasionally, however, dedicatory inscriptions, find spot, and accompanying figures help with the identification. Thus the three overlapping females on two sixth-century BC painted wooden plaques from the Pitsa cave near Corinth can be securely identified with the Nymphs because of the dedicatory inscription on one of them and their find spot, since caves were popular places for the worship of the Nymphs (Orlandos 1965; Larson 2001, 232–3).[9] Similarly, stone reliefs and terracotta plaques depicting dancing female triads found in cave sanctuaries can be assumed to depict these specific divinities. Moreover, the association with the pastoral gods Hermes and Pan, typical companions of the Nymphs, may also offer a clue (Levi 1923–4, 34 fig. 9 nos. 2–4; Larson 2001, 226–67).[10]

A late sixth-century BC stone relief from Laconia, now in Brussels, may also depict Nymphs according to one interpretation of its inscription. Three peplos-wearing women stand in profile to the right, one holding a necklace or garland, the second a fruit, and the third a

[4] Indeed, the finds from the Orthia sanctuary are generally very similar to the ones from Gortyn: Carter 1985, 156–7.

[5] In *Od.* xviii. 193–4 Aphrodite joins the dances of the Charites; Sokrates (in Xen. *Symp.* 7. 5) refers to the dance of Charites, Horai, and Nymphs.

[6] Perhaps the group on the Athenian Akropolis by Sokrates: Ridgway 1970, 115–18; figs. 153–5; but see more recently Palagia 1990.

[7] A small marble relief probably from Sparta reportedly depicts in flat relief three similar frontal females wearing a chiton and himation and having the right hand on the breast and the left by the side. The relief has been dated to the 1st c. BC and interpreted as a votive to the Charites or Nymphs: Tod and Wace 1906, 190 no. 572; Stibbe 1991, 42 (no. H14). Since no picture has been published, we cannot venture an identification.

[8] There is no good reason, for example, to identify 5th- and 4th-c. BC figurines representing a group of three females with the Charites: Higgins 1967, 82 no. C34 (from Corinth); Mollard-Besques 1954–86, i. 88; pl. 62 (from Boiotia) nos. C34, C35; Goldman 1940, 395–6; fig. 21 (from Halai).

[9] Cf. a stone relief from Lesbos depicting three frontal women holding hands, and inscribed with a dedication to the Nymphs: Charitonides 1965, 492; pl. 629.

[10] See also the terracotta plaques from the Caruso cave at Lokroi Epizephyroi, depicting three female heads at the top of a broad pillar: Larson 2001, 251–6.

flower, very much like the Charites and Nymphs on the Thasos reliefs (Fitzhardinge 1980, 83 fig. 97; Hadzisteliou-Price 1971, 56–7). The inscription on the background, ΚΟΡΑΣ ΣΟΤΙΑΣ, can be interpreted as either 'Sotias dedicated to the Kora', or 'Sotias dedicated the korai.' Although the maidens are not shown dancing, they could very well be Nymphs, since the name *korai* could be applied to them (e.g. Hom. *Od.* vi. 122; Hadzisteliou-Price 1971, 56; Fitzhardinge 1980, 83 proposed the Fates). It has also been suggested that *Sotia* was a local version of *Soteira*, an epithet of Kore, whose sanctuary was by the Spartan agora (Paus. iii. 13. 2); in that case the relief would represent three maidens bringing offerings to Kore (with the dedication 'of Kora Soteira': Jeffery 1961, 193).

The early Gortyn triads have been identified by some also as local Nymphs.[11] Another interpretation, however, sees the females as mortal women-priestesses in the service of a fertility goddess, based on the association of naked female figures in Greece, as in the Near East, with sexuality and fertility.[12] The presence, however, in the same sanctuary of numerous objects on which the same type of female figure appears both in single and in multiple form has inspired a third, indeed controversial, approach for the interpretation of groups of identical females: that the double and triple representation of a female figure may not indicate distinct deities very closely connected, but one and the same divinity in multiple form (Levi 1955–6, 244; Rizza and Santa Maria Scrinari 1968, 54, 250–1; Christou 1968, 36–41; Hadzisteliou-Price 1971, esp. p. 69; Blome 1982, 76). Such a repetition could be understood as strengthening of the divine potency (Usener 1903, 191; Blome 1982, 77), as an expression of the various aspects of the same deity (Christou 1968, 46–8, 170–1), or both (Hadzisteliou-Price 1971, 54, 69).

It is true that Greek religious mentality allowed different personae and aspects for one and the same divinity, so that the existence of more than one statue and temple for the same god was not unusual (Usener 1903, 195–200, 205–8; Herington 1955, 35–7; e.g. on the Athenian Akropolis Athena had several cults and shrines). Some literary references in the plural to deities commonly known in the singular appear indeed to support the idea of the multiplication of a single divinity. The birth goddess Eileithyia, for example, was known at least since Homeric times both in the singular (Hom. *Od.* xix. 188) and in the plural, Eileithyiai, as daughters of Hera (Hom. *Il.* xi. 270; a cult of the Eileithyiai is indeed attested in Boiotia, Megara, and Delos: Paus. i. 44. 2, viii. 21. 3; Hadzisteliou-Price 1971, 53; and in Athens Eileithyia had three xoana: Paus. i. 18. 5). The reason for this variation, however, may be that the functions embodied by the goddesses, originally conceived in the dual as assisting in labour from either side, were later condensed into one figure.

In visual art, a few enigmatic works show a single divinity in multiple form. A late Archaic votive relief, for example, shows two identical 'Athenas,' as the gorgoneia on the shields indicate (Hadzisteliou-Price 1971, 55; pl. 1. 1). Whatever the message communicated by this image, it cannot have been the illustration of two different aspects of Athena (as Hadzisteliou-Price 1971, 53 believes) because one would expect some differentiation. Representations

[11] S. Marinatos 1962, 915–16 identified them with the Geraistian Nymphs, nurses of Zeus, based on two glosses of the *Etymologicum Magnum*, one referring to the Geraistian Nymphs as especially honoured in Cretan Gortyn, and another explaining Geraistion as a place in Arcadia where Zeus was swathed in swaddling clothes. See, however, the cautious remarks of Hadzisteliou-Price 1971, 50 on the chronological difference between the references and the monuments.

[12] This goddess could be different in each case: Böhm 1990, 127–34, 136–40. N. Marinatos 2000, 27–31 associates the naked females with initiation rituals.

such as this are indeed puzzling, but because of the lack of conclusive evidence, such as inscriptions, the theory of the visual expansion of one deity into two or three figures should remain hypothetical.

LACONIAN TRIADS

The find spots and iconography of the Laconian plaques do not generally support an identification of the female groups with a specific divine or semi-divine triad or with a single divinity shown in multiple form. The only exception may be the plaques with the three women holding hands (FIG. 3). If they are indeed dancing, the Charites and Horai must be excluded, since the Laconians worshipped only two Charites and two Horai (Paus. iii. 18. 6, 10; 14. 6). They could still, however, be Nymphs, since these were conventionally depicted as a triad and were associated with dancing. With the exception of the Menelaion plaque, on which the arms of the women are clearly by their sides, the same could be assumed for the other triads, since painted details may originally have portrayed them with joined hands. The find spots, however, do not support such an interpretation, since the link is with heroic cults.

A more likely and flexible interpretation would see the figures as mortal worshippers in the service of the divinity of the sanctuary to which the plaques were dedicated. Their number would have been just an expression of the concept of plurality: not one or two, but many. There is indeed some evidence for such a concept of plurality in ancient sources and its application to religion. According to Plutarch (*De Is. et Os.* 36), 'thrice' was used instead of 'many times'. Aristotle, who like the Pythagoreans considered the triad the number of the complete whole, added that the number three was provided by nature to be used in the service of the gods (*Cael.* i. 1).[13] From an artistic point of view, three standing figures are a convenient number (Harrison 1899, 218), since they create a balanced composition that fits nicely into the restricted square ground of the plaques.

The interpretation of the female triads on Laconian plaques as mortal worshippers, which may also apply to other triads of identical females (Kassimatis 1982, 461; Hadzisteliou-Price 1971, 66–7), is supported by similar fourth-century BC plaques found in neighbouring Messenia alongside other plaques depicting seated figures, riders, warriors and banqueters, similar to those from Amyklai. Sixteen plaques found in the area of a tholos tomb at Voidokilia, and associated with hero cult, represent three female figures walking to the left or right (Korres 1982, pl. 135 δ; 1988, 319, fig. 4; Peppa-Papaioannou 1987–8, 259, 271; figs. 13–14). On one plaque the figures have one arm bent carrying offerings (Korres 1982, pl. 135 δ left), while on another they wear long dresses, which swing slightly at the back, and possibly a mantle over the head; the right arm is bent and raised in the adoration gesture (Pylos Museum no. 1917: Korres 1988, 319, fig. 4 right). The schematic rendering in flat relief with slightly raised outlines recalls the Amyklai and Astros plaques (FIGS. 5–6). Other plaques found in a hero shrine located in the later sanctuary of Demeter at ancient Messene again represent three female figures whose rendering varies from very schematic to more naturalistic. Several are made in the same moulds as those from Voidokilia (FIG. 8 *a–b*).[14] Another plaque found in Sparta (Sparta Museum no. 6459/57) shows similar frontal figures

[13] For 'three' as a term of approximation or of an indeterminate number of times ('a few', 'many'), see Usener 1903, 357–60; Lease 1919, 57, 67–9; Deonna 1954, 409–14; Perry 1973; A. Bell 1975; Hansen 1976.

[14] Themelis 1998, 174–5; figs. 37–40; 2000, 25–7; figs. 22 α–γ, who identifies the triads with Leukippos' daughters, Phoibe, Hilaeira, and Arsinoe.

FIG. 8 (*a–b*). Terracotta plaques from Messene: female triads (after Themelis 2000, 26 fig. 22 α and γ).

with one raised arm, possibly holding something, but because of its fragmentary state it is not entirely certain it originally depicted a triad (FIG. 9).[15] In short, the arms of the figures raised in adoration or holding objects on the Messenian and Laconian plaques support their identification as mortal worshippers bringing offerings or involved in a ceremony.

Scenes representing a divinity approached by one or more adorants are very common on votive stone reliefs. But adorants could also be depicted without the divinity being present. For example, votives representing adorants alone are described in the inventories from the Athenian Asklepieion (*IG* II^2 1534a = Inv. IV, l. 90; van Straten 1981, 82 n. 80), and a fifth-century BC Laconian stone relief from Angelona (Athens National Museum no. 3120) shows a man in adoration gesture in front of an altar (Stibbe 1991, 9 fig. 26). Similar representations of worshippers raising one arm appear on fourth-century BC metal votive plaques from Mesembria in Thrace. The mortal figures are depicted either together with the deity[16] or alone, and may appear in the singular, in dyads or triads.[17] I would suggest that the plaques with images of adorants alone were placed next to plaques depicting the divinity,[18] thus composing scenes analogous to those on which deities and mortals appear together. The same could be assumed for the Laconian and Messenian plaques: plaques with worshippers could have been placed side by side with those depicting the seated hero. An exceptional

[15] The estimated size and shape of the plaque support the restoration of three figures. The plaque was found together with other plaques and lead figurines on Tripolis Street in Sparta and not at Amyklai as reported in Stibbe 1991, 38, 43; fig. 39. An unpublished plaque from the second Amyklaian deposit shows the figure to the left raising one arm, as reported to me by the excavator N. Themos.

[16] e.g., Ninou n.d. 106, no. 452; pl. 60 represents Demeter approached by a family of four making the adoration gesture.

[17] Ninou n.d. 104–5, nos. 434–44; Tsatsopoulou-Kaloudi 1984, 63 fig. 11 upper left. Plaque no. 445 reportedly depicts three 'Nymphs-Eumenides'; the differentiation implies that we are dealing with figures that are not adorants, perhaps if the arm is not raised.

[18] Cf. a fragmentary Tarentine plaque depicting at least four standing women with trays on their heads: Wuilleumier 1939, 398–9, pl. 27. 4. The divinity to whom they bring the offerings is not depicted on that plaque but separately on others.

FIG. 9. Terracotta plaque from Sparta: female triad (?) raising one arm. Sparta Museum no. 6459/57 (after Stibbe 1991, 30 fig. 39).

plaque from the Limnai deposit gives an idea of the final effect of such positioning. In front of an enthroned male are depicted three diminutive figures; the one to the left, larger and apparently male, is taking a step with one arm probably bent and raised.[19]

The existence of plaques depicting three figures clearly characterized as worshippers or offering-bearers suggests a plausible explanation for most of the Laconian plaques depicting three identical figures; a raised arm may originally have been added in paint on the schematic plaques. Even the figures holding hands (FIG. 3) could be mortal women performing a ritual dance in honour of the divinity, instead of Nymphs, since ritual dances were a significant component of Spartan cult in general.[20]

The disparity in height of the figures on the two plaques from Amyklai and Astros (FIGS. 5–6) may indicate varying ages of the worshippers, as on the Limnai plaque and a metal plaque from Mesembria that include children (Ninou n.d. 106, no. 452, pl. 60).[21] The plaque depicting three figures with wreaths (FIG. 4) seems to represent females making the adoration gesture. The position of the wreaths in mid-air, however, cannot be easily explained. They could be an indication of a festive occasion, as on a Laconian votive relief depicting a

[19] Sparta Museum no. 13469; Flouris 2000, 55, 105; pl. 86. The scene strongly resembles that on the Chrysapha relief (Pergamon Museum, Berlin no. 731: Salapata 2006, 544 fig. 3). A plaque from Messene shows two worshippers in front of a larger seated male: Themelis 2000, 21 fig. 17.

[20] On the ritual dances performed in honour of Orthia, see Plut. *Vit. Thes.* 31; Alkman's *Partheneion*; Constantinidou 1998. Cf. a Lokrian plaque with three maidens holding hands and thus presumably dancing towards a seated woman, most likely Persephone: Prückner 1968, 65–6; pl. 11. 1. They are usually interpreted as the Charites, but are more likely mortal worshippers. On women dancing in a cultic context, see Kleine 2005, esp. 65–6.

[21] Phaklaris's suggestion (1990, 189) that the figures on the Astros plaque represent the Delian triad remains hypothetical, since the gender of the figures is undifferentiated.

procession, where a wreath is held by one figure and another appears in the background (Smith 1892–1904, iii. 238 no. 2181, fig. 29). Alternatively, if the wreaths were supposed to be carried by the figures, a ribbon, added in paint, could have shown them as hanging from their arms. Regardless of whether the hands of the figures are raised in adoration or carrying the wreaths, the composition resembles scenes commonly found on votive reliefs.[22]

TRIAD FLANKED BY SNAKES

Notwithstanding the interpretation of the Laconian female triad as mortals, a special case can be made for the unusual group of plaques showing an identical female triad flanked by snakes (FIG. 7 *a–b*). This female triad is certainly outside the sphere of ordinary mortals, with the presence of the snakes pointing to the chthonic character of the figures.[23]

For parallels of a female figure flanked by snakes we may first turn to the sanctuary of Orthia. A fragmentary seventh-century BC ivory fibula plate found there depicts a winged female figure, presumably the honoured goddess, with a bird in her right hand and a snake curling up in front of her (Dawkins *et al.* 1929, 207, pl. 93. 2; Marangou 1969, 22 fig. 14). The snake and the bird, very likely duplicated on the missing right side of the plaque, may have symbolized the chthonic and the celestial realm of the goddess (Christou 1968, 145). A related painted scene is preserved on a fragmentary early fifth-century BC jug from the same sanctuary (FIG. 10; Dawkins *et al.* 1929, 104 fig. 78 *b*; Stibbe 1998, 71–3; fig. 6. 15–17). Two vertical undulating snakes flank a figure in long dress, painted in the black-figure technique. The gender of this figure is uncertain, since in Laconian vase-painting males also can wear a long garment and females can be rendered in black. By analogy with the ivory fibula, however, this figure is probably also female, presumably Orthia (Marangou 1969, 24, 222 n. 119).[24]

Moving beyond Laconia, we find a female figure flanked by upright snakes on a mid-seventh-century BC terracotta plaque found in the Athenian Agora (Burr 1933, 604–9 no. 277; figs. 72–3; D'Onofrio 2001, 305–8). The snakes point again to the chthonic realm, and the plaque, because of its find spot, may have been associated with the cult of the dead.[25] The snakes and the epiphany gesture of the frontally depicted female recall the Minoan 'snake-goddess', a πότνια θηρῶν (Evans, *PM* i. 500–8, figs. 359–62), and indeed the Agora figure has been considered by many her iconographic survival.[26]

Unlike the case of the single female figure flanked by snakes, the iconographic scheme of a triad flanked by snakes is, on present evidence, not found anywhere else in the Greek world. The closest parallel is the Erinyes, who were conceived as a triad from the fifth century BC

[22] See a fragmentary Laconian votive relief in the British Museum: two women followed by a girl are shown in procession to an altar holding up a wreath in their right hand: on the other side of the altar was probably Eileithyia, if the fragmentary inscription has been restored correctly: Smith 1892–1904, iii. 238 no. 2180; fig. 28; Dressel and Milchhöfer 1877, 432 no. 5; Pingiatoglu 1981, 60–1; pl. 14. 2.

[23] On the role of the snake as a heroic emblem on other Laconian plaques, see Salapata 1997; 2006.

[24] Stibbe 1998, 73, arguing that the meaning of the figure flanked by snakes changed in the fifth century BC, associates it with hero cult.

[25] Burr 1933, 637–9 tentatively associated the deposit in which the plaque was found with the sanctuary of the Mother or the Semnai/Eumenides, but identified the oval structure where the deposit was found with a house. Since the discovery, however, of a triangular enclosure nearby and of Geometric graves in the area, the oval structure has been identified as a building dedicated to the cult of the dead: Abramson 1978, 159–61. D'Onofrio 2001 argues that the oval structure, after having been used as a house, became a heroon, maybe associated with civic functions.

[26] Cf. the Lydian Kybele standing at the door of her shrine and flanked by snakes on a 6th-c. monument from Sardis: Hanfmann and Ramage 1976, 15 no. 7; figs. 20–50. On the survivals of the Minoan goddess with upraised arms in later art, see Alexiou 1958, 275–92; Christou 1968, 55, 145. N. Marinatos 2000, 119–29 disagrees that there is a link between the Minoan and Greek mainland goddesses with upraised arms.

FIG. 10. Early fifth-century BC jug from the Orthia sanctuary: figure flanked by snakes (after Dawkins *et al.* 1929, fig. 78 *b*).

onwards and were associated with snakes. As protectors of the order of the universe and executors of divine justice, these avenging divinities pursued and punished those guilty of interfamilial strife (especially murder), perjury, and violation of hospitality. As chthonic goddesses they had the power to destroy but also to promote human well-being, and thus received cult under the propitiatory name Eumenides (Sarian 1986; Lloyd-Jones 1990; Johnston 1999, 250–87; Lissarrague 2006).

The connection of the Erinyes with snakes seems to be an early one and may have been related to their association with the dead and the Underworld since they often act as avenging agents of the dead.[27] Originally conceived as snakes or at least as creatures with serpentine qualities (e.g. Aes. *Cho.* 1049–50 πεπλεκτανημέναι πυκνοῖς δράκουσιν, Eur. *Or.* 256 δρακοντώδεις κόραι, *IT* 286 Ἅιδου δράκαιναν), they were later imagined as women associated with snakes. While in mythological illustrations the Erinyes are usually depicted aggressively pursuing their victim brandishing snakes,[28] in a cultic context the snakes become simply their attributes. Thus, on an unusual group of Hellenistic stone votive reliefs found near Argos are depicted three standing females holding one snake in each hand or snakes and poppy-flowers (or poppy-heads). Three of these reliefs are inscribed with dedicatory inscriptions to the Eumenides (Milchhöfer 1879, 152–3 nos. 498–500, pls. 9–10; Papachristodoulou 1968; Sarian 1986, 839 nos. 112–19; Schaefer 2001–2).

On the basis of the stone reliefs from the Argolid and the general association of the Erinyes

[27] Lloyd-Jones 1990, 206, who suggests that they originally were ghosts of murdered persons. Johnston (1999, 273–9) argues strongly against their identification as souls of the dead.

[28] Lissarague 2006. For a possible 6th-c. BC representation of the three Erinyes in the form of snakes, see Grabow 1998, 162.

with snakes, the Laconian terracotta female triad flanked by snakes can be identified with these characters.[29] It is significant that plaques depicting a triad with snakes were found only in the deposit associated with the sanctuary of Alexandra/Cassandra and Agamemnon at Amyklai. If the identification with the Erinyes is correct, the Amyklai plaques would provide further insights into the nature of the cult at this sanctuary and its associated legends.

The personality and cult of Alexandra at Amyklai were based on the Panhellenic epic character of the Trojan princess, the captive and consort of Agamemnon, who was murdered with him (Salapata 2002*b*). Pausanias (iii. 19. 6; ii. 16. 6–7) states that in this sanctuary were located the reputed graves of Agamemnon and Cassandra, a statement reported with reservation since the people of Mycenae also claimed to possess their graves. The Amyklaian cult then had a heroic character, centred on the alleged graves of Agamemnon and Cassandra. The foundation legend must have involved their murders, which according to a variant local tradition had taken place not in the Argolid but in Laconia, and specifically at Amyklai. This version of the myth and the related cult may have been promoted by the Spartans when they aspired to become the sovereigns of the Peloponnese. By appropriating the most famous epic king, traditionally also affiliated with Argos, they could have placed a claim on the hegemony of the Peloponnese and appeared superior to their rival city.[30]

On the basis of the information we have about the Amyklai sanctuary, we can deduce that representations of the Erinyes, ministers of divine justice, would refer to the murders of Kassandra and Agamemnon, which must have been an important constituent of the cult there.

Conclusion

On present evidence, we cannot ascribe a single interpretation to all cases of triple figures depicted on Laconian terracotta plaques. Despite the almost total lack of specific attributes, most triads seem to represent a group of mortal female worshippers rather than a specific divine or semi-divine triad. The addition of painted details may originally have provided the figures with arms raised in adoration or with joined hands suggesting ritual dancing. Plaques representing worshippers were generic offerings that could be dedicated at different sanctuaries with the intention of ensuring the repetition of the dedicator's prayer or celebration in perpetuity.

The triads flanked by snakes undeniably imply divine or semi-divine beings with chthonic associations, most probably the Erinyes. Given that the only examples come from the Amyklai sanctuary, such an interpretation would harmonize with the nature of the cult there. Offerings with the representation of the avenging spirits would have been very appropriate for Agamemnon and especially Cassandra, who suffered an untimely, violent, and wrongful death that was never properly avenged.[31]

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[29] It is possible that the schematic figures may originally have been provided with painted arms that held the snakes, giving a similar appearance to the Argos figures. For a cult of the Erinyes in Sparta, see Hdt. iv. 149. 1.

[30] The tradition is presented clearly first by Stesichoros (schol. Eur. *Or.* 46: *PMG* 216) but may go back to earlier times: Malkin 1994, 28, 31–3; Hall 1997, 91–3; Salapata 2002*b*.

[31] On the connection of the Erinyes to the *biaiothanatoi* and the *aoroi*, see Johnston 1999, 273. In Salapata 2002*b* I have argued for an expiatory ceremony at the Amyklai sanctuary instituted to atone for Kassandra's murder.

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EAST GREEK POTTERY IN THE COLLECTION OF THE BRITISH SCHOOL AT ATHENS[1]

THE examples of East Greek pottery presented here are housed in the museum of the British School at Athens. They represent the sequel to the publication of the black-figure vases and are part of the ongoing publication of the School's antiquities (Smith 2003, 348 n. 3; Pisani 2006; see also Calligas and Whitley 2005, 108). Some of the East Greek pieces have been studied and published previously, most notably by R.M. Cook and A.A. Lemos. The findspot for the East Greek objects, where known, is Naukratis, and in one instance each Old Smyrna (**9**) and possibly elsewhere (**21**), all archaeological sites where the British School has conducted excavations.[2] Others have no known archaeological provenance, but their fabrics, style, and iconography may suggest their place of production, as may more scientific criteria. It is possible that the unprovenanced objects were discovered during the course of excavation at Naukratis, as all represented types and styles are well-documented from the site, but they could also be from elsewhere.[3] This group of material was originally assembled as part of the much larger publication of Archaic black-figure vases, which included Athenian, Corinthian, Boeotian, and Euboean wares (Smith 2003).[4] However, the East Greek material presented here deserves separate discussion, as many pieces share a common provenance and most are not technically black-figure.

Although by no means always representing the best examples of either craft or craftsmen, both the sherds and whole pots serve well their purpose of the School's study collection. The ongoing publication of this collection not only increases our knowledge, however slightly, of these areas, but also documents in detail a less familiar aspect of the School's history. What follows is a brief discussion of the excavations at and finds from Naukratis, as well as the School's role there; an overview of the East Greek pottery in the collection; and a catalogue, including a brief introduction to each of the relevant stylistic areas represented. An appendix presents a hitherto unpublished vase in the School's collection, an Attic polychrome phiale

[1] My thanks to John Boardman, who read this manuscript and allowed me at an earlier stage to look through his notes on Naukratis, which are now kept at the British Museum; also to A.A. Lemos (Athens), A. Tsingarida (Brussels), A.C. Smith (Reading), A. Villing (British Museum), S. Weber (Mainz), D. Weiss (University of Virginia), A. Johnston (London), D. Williams (British Museum), Z. Stamatopoulou (University of Georgia), and M. Zachariou (Virginia/Rhodes). For permission to publish this material, I thank David Blackman, former Director of the School, and for access to it, Rebecca Sweetman and Eleni Hatzaki, both formerly Assistant Directors. Robert Pitt, the current Assistant Director, has also provided much needed assistance. A special word of thanks is extended to directors of the Kato Phana excavations, L. Beaumont and A. Archontidou-Argyri, then of the British School at Athens and the 20th Ephorate of Prehistoric and Classical Antiquities respectively, who allowed me to join their team in 2000 and granted me access to materials in the splendid Chios Archaeological Museum. Both the British School at Athens and the McIntire Department of Art, University of Virginia provided support to enable travel to Athens and extended stays at the School. The photographs were made by C. Stewart, M.A. Bevivino, R. Pitt, and the author. The drawing of FIG. 2 *b* was made by R. Pitt, and that of FIG. 9 by D. Weiss.

[2] Waterhouse 1986, 120–1 (Naukratis), and 114–16 (Old Smyrna). Kardara (1963) lists **4** and **6** as coming from Naukratis, but this is not indicated in the School's current museum records.

[3] As the material is unstratified, and has adequate parallels for decoration elsewhere, profile drawings have not been included for the sherds of uncertain shape.

[4] A catalogue of this material was submitted previously to the Ephorate of Private Collections, Ministry of Culture.

mesomphalos. The phiale, although not East Greek, shares both technical and decorative features with some East Greek wares and for many years the School's records indicated that it belonged to the stylistic category known as Vroulian (R.M. Cook and Dupont 1998, 114–15). Its inclusion here enables us, on the one hand, to establish its correct identification and, on the other, to consider its possible relationship to East Greek and other Archaic pottery.

East Greek Vases, Naukratis, and the British School at Athens

East Greece is arguably one of the most difficult areas of Archaic pottery studies, and there has been considerable debate over the years regarding provenance, fabric, and painter attribution. The main styles of East Greek pottery produced during the sixth century, such as the Wild Goat Style (henceforth WGS), Chian, Fikellura, Clazomenian, and the distantly related Clazomenian sarcophagi, are now well studied and their places of manufacture better understood (Akurgal *et al.* 2002; Boardman 2006). For example, Miletos is now known as the home of the Fikellura style, while the island of Chios has been established as the source for chalices and other vessels (Jones 1986, 662–71; Boardman 2001, 290–3). Of these varieties, the WGS, Chian, Fikellura, and Clazomenian are included in the School's collection. Shortly before his death, R.M. Cook published (with P. Dupont) the culmination of his life's work on the subject in *East Greek Pottery* (1998). Cook's depth and breadth of knowledge in this field was unprecedented and remains impossible to replicate. However, other scholars have added substantially to our understanding of specific areas of production, among them A.A. Lemos for Chian and G. Schaus for Fikellura. Furthermore, M. Kerschner and U. Schlotzhauer (2005) have proposed a new system of classification for all East Greek pottery, with greater emphasis on production places and regions alongside chronology. Their study is of special relevance to WGS and Fikellura, since examples of both are included in the School's collection. The discovery of East Greek pottery predictably continues with quantities of Fikellura unearthed during the course of excavations at Miletos, and with many examples of the ubiquitous Chian white-slipped chalices from Kato Phana.[5]

The ancient site of Naukratis, located in Egypt on the Canopic branch of the Nile, continues to attract significant scholarly attention. Recent studies devoted to the site, its character, and finds, each confront and recount the same series of problems (Möller 2000; Höckmann and Kreikenbom 2001; Villing and Schlotzhauer 2006*b*). The site was discovered by Sir Flinders Petrie in the late nineteenth century, first excavated by him in 1884–5, and identified as the place referred to by Herodotus as a commercial port, indeed 'in the old days ... the only port in Egypt' (ii. 178–9). Excavations followed in 1885–6 by Ernest Gardner and some years later by David Hogarth. The more recent excavations of Leonard and Coulson focused primarily on the post-Archaic site and finds, floral and faunal remains, modern environmental problems and working conditions of the area (Leonard 1997, 1–35; Leonard, Berlin, and Weiss 2001; Möller 2000, 92–4). However, it is the early excavations at Naukratis that are of interest here, in part because members, and later Directors of the British School (Gardner and Hogarth), became atracted to the site following Petrie's initial discovery of an 'abundance of Greek pottery' and other artefacts (Petrie 1885, 202). Gardner conducted excavations under the

[5] For Fikellura, see Müller-Wiener 1987; von Graeve 1990; Ketterer 1999; and Schlotzhauer 1999. See also Greaves 2002, 89–92 and Mannack 2002, 184. For Kato Phana, see Blackman 2001, 112–13 and Beaumont and Archontidou-Argyri 2004, 201–55, esp. 217.

auspices of what was then the Egypt Exploration Fund, and Hogarth's campaign of 1899 was sponsored and partially funded by the British School at Athens itself.

Of critical importance to the present discussion is the afterlife of the pottery discovered during the course of these excavations. As R.M. Cook so aptly stated in 1954: 'Four campaigns of excavation were undertaken at Naucratis, two by the Egyptian Exploration Fund (now Society) and two by the British School at Athens. Their rich finds of Greek pottery were in the main fragmentary, the fragments rigorously selected, and the selections widely distributed' (*CVA* British Museum 8 (13), Appendix B, 60–1). It seems that the Egyptian Exploration Fund allotted finds from Naukratis to its subscribers, a decision that would surely raise many eyebrows today (e.g. Fairbanks 1928, 94; Möller 2000, 90 n. 4; Kerschner 2001, 72). At least some of the pottery, however, remained in Egypt and was divided between the Egyptian Museum in Cairo and the Graeco-Roman Museum in Alexandria.[6] Of the vast amount distributed elsewhere, the largest cache is held at the British Museum (some 50% is the current estimate), with substantial amounts also in the Museum of Fine Arts, Boston (Fairbanks 1928, 94–135, esp. 98–119). The remaining East Greek and other finds have been published sporadically by respective collections or museums, both large and small, but a concerted effort is under way at the British Museum and the Mainz Naukratis Project to locate and catalogue on a database all known Greek material from the site (Villing and Schlotzhauer 2006*b*; Piekarski 2001). This attempt to reassemble all the finds from Naukratis will be beneficial in many respects (especially to scholars interested in the nature of the objects), but its value for understanding the site's stratigraphy and history is limited by the poor archaeological technique and failure to preserve contextual information.

A second area of Naukratis studies, which is particularly relevant here, is the so-called 'Chian-Naucratite' problem (Boardman 1956; 1986). A vast amount of the characteristic thin-walled, white-slipped (formerly known as 'white-faced') Chian painted pottery was discovered during the course of excavations at Naukratis (e.g. Hogarth *et al.* 1905, 115). John Boardman (1956) suggested that it was manufactured on site at Naukratis, while using imported Chian clay. Although he has revised or retracted some of the details of this argument, he has continued to uphold it. Of the pottery discovered at Naukratis he has much more recently stated: 'It included some plain kantharoi with pre-fired inscriptions on them, bespoke for dedication at Naucratis' sanctuaries. The suspicion lingers that these were made there with imported clay (Nile clay is horrid), rather than ordered and then carried (they are very fragile) from Chios ...' (Boardman 1998, 144; cf. Möller 2000, 136–40). Not all have been convinced by this idea; yet, we may now be more certain of local Chian production for much Chian pottery, even if some stylistic varieties may have been produced additionally at Naukratis (Williams 1983; Lemos 1991, 117–18; Williams 2006). At the same time, pottery of Chian style has been discovered in northern Greece, leading to suggestions of a workshop also active there (Lemos 1991, ch. 7; Walter-Karydi 1973, 74–6; Coulié 2002). The Chian sherds in the School's collection, whether discovered at Naukratis or elsewhere, are unambiguously 'Chian' in their decoration, fabric and the representative chalice-shaped cup of all but one (**10**). It is worth remembering that an enormous amount of the pottery unearthed at Naukratis is not Chian; the finds also include Corinthian, Attic black- and red-figure, Laconian, and of the other East Greek wares WGS, Aeolian, Fikellura, Clazomenian, bowls

[6] Venit 1988, in general, and p. ix for the distribution of finds outside Egypt. Villing and Schlotzhauer 2006*a*, 9 n. 12 list the currently known whereabouts of the material, including the British School at Athens.

(Bird, Rosette, Eye, Ionian), Vroulian, Ionian Little-Master cups, and some unspecified types (Möller 2000, 216–61; Schlotzhauer and Villing 2006). As Miss H.L. Lorimer wrote in her 1905 publication of the pottery from the 1903 season: 'How much farther the process of parcelling out the motley fabrics of Naukratis among her equally motley population may in the future be carried, it is of course impossible to predict' (in Hogarth *et al.* 1905, 120).

Summary of the East Greek Pottery in the School's collection

The few pieces of East Greek wares presented here in summary form appear in more detail and with comparanda in the catalogue, where they are divided into the broad stylistic categories of WGS (**1–7**), Fikellura (**8**), Chian (**9–18**), Clazomenian (**19**), and Other/'Bowls' (**20–1**). It seemed helpful, however, to place first the material within the larger framework of East Greek pottery. A brief look at the techniques, shapes, and iconography also allows us to relate this handful of whole pots and sherds to other fine, figure-decorated vases produced around Greece throughout the Archaic period. In the absence of exact archaeological provenance, there is little further to be said about chronology. At the same time, it seems likely that the East Greek pieces belonging to the School's collection were hand-picked with the pedagogical aim of representing a range of styles, shapes and decorative techniques.

Beginning with the techniques and styles, we observe among the School's collection a good range of both. The WGS sherds combine silhouette and outline (**1–2**) and, on some later examples, also black-figure (**3**, **5**, **7**) as indicated by the use of incision. Reserving is also visible in the WGS (**1–2**) and, as we should anticipate, on the Fikellura fragment (**8**). White slip is used frequently in East Greek painting and from more than one area of production. It is not surprising to find it amongst the pottery of the WGS and Chian, as well as added white embellishing the crescent design on the joining Clazomenian fragments (**19**). Polychrome, which is much less frequent outside the sphere of East Greek vase-painting, is represented by the combination of black paint, white slip and added red (e.g. **9–11**; Lemos 2000, 384–9). However, it is best demonstrated by several Chian chalice sherds that depict a white-ground technique on their exterior and a black-ground polychrome on their interiors (**9–13**; cf. **App. 1**). The interior 'light on dark' decoration was obviously intended to be viewed and enjoyed, although the practicality of drinking from these so-called chalices is questionable because of the fragility of both fabric and design; indeed it is also found on phialai and kantharoi, and perhaps a ritual or votive function is a realistic interpretation (Lemos 1991, 118–19; Boardman 1998, 146).

The shapes in the School's collection are again quite representative of their particular styles and aid somewhat in understanding basic chronology. Both closed and open vessels are represented in the WGS, and where identifiable include the dinos (**3**), oinochoe (**5**?, **6**?), amphora (**6**?) and hemispherical bowl (**4**). The one Fikellura fragment (**8**) is, not surprisingly, from a belly amphora (R.M. Cook and Dupont 1998, 77 and figs. 10. 6 and 10. 8). Each of the Chian sherds in the School's collection belongs to a thin-walled chalice (**9**, **11–8**), with the exception already noted of the two non-joining fragments of a closed vessel in the Sphinx and Lion Style (**10**), identified as belonging to the neck of an oinochoe or to a stand, although the exact shape remains uncertain.[7] The single Clazomenian vase survives in two

[7] Lemos 1991, 133–40 summarizes the shapes in this style, although is uncertain of the exact shape of the BSA fragment; cf. Walter-Karydi 1973, 67 and 138. The stem of a skyphos krater or the bell-shaped vase are other possibilities, Lemos 1991, 135 fig. 74, and 139, fig. 77.

joining fragments (**19**), and comes from a slim amphora, the shape (averaging intact *c.*45 cm high) most typical of the Petrie Group to which R.M. Cook assigns them (Cook and Dupont 1998, 98 and fig. 12. 3 *a*). Finally, the Bird Bowl (**20**) and Rosette Bowl (**21**) are themselves related shapes, and perhaps also the not so distant cousins of the plainer Ionian Cups (ibid. 131; Akurgal *et al.* 2002, 63–72). Although the Bird Bowls, which are earlier in date and retain Geometric motifs, are eventually replaced with the Rosette version, the two forms and their distributions are similar (R.M. Cook and Dupont 1998, 26–7; Coldstream 2008, 298–301).

The iconography and decoration of the pottery in the School's collection is also in many ways representative of specific East Greek wares, as well as in some cases, of more widely practised Archaic trends. The subsidiary ornamentation, largely focused on floral themes (e.g. **4**, **5**), rosettes (e.g. **1**, **5**, **9**, **14**), half-rosettes (e.g. **10**), scale patterns (**19**), crescents (**8**, **19**), and cables (**3**) are each well-documented motifs in East Greek vase-painting, and in their individual details they may be associated with various times and places. Its 'tapestry-like effect' has led to the suggestion of eastern textiles as a source of inspiration (Boardman 1998, 142). The Bird Bowl (**20**) and Rosette Bowl (**21**) are expected components in any representative East Greek collection, regardless of its size. These were made in great quantities, the former associated with East Greek Subgeometric, and the latter its humble successor. Many have been discovered within archaeological contexts, but their dating is at least in part based on better understood Protocorinthian and Corinthian pottery sequences (R.M. Cook and Dupont 1998, 26). The animal style, ubiquitous throughout the seventh century, and produced in various centres, is well represented here by the WGS (**1–3**, **5**, **6–7**), although the fragment of a Fikellura amphora (**8**) demonstrates the reluctance of many East Greek artisans to part totally with the much-loved theme. Not only are there the expected springing or grazing goats found (**1–2**, **8**), but also birds (**3**, **7**) and felines (**5**, **7**), which appear in black-figure and belong to the Late WGS (R.M. Cook 1997, 114). The often fragmentary state of Chian pottery is always a frustration for those interested in their overall iconography. Nevertheless, the combination of exterior and interior decoration in two different techniques, supplies an unusual amount of information for study. Again the animal style is portrayed, including sphinxes (**9–10**, **12**?) and felines (**9–10**). The mythological realm is represented by a fragment depicting the helmeted head of the goddess Athena (**17**), perhaps another with the head of Herakles (**15**), while the subject of daily or religious life is suggested by a horse and rider (?) (**14**), a kicking komast dancer (**18**), and possibly a religious procession (**16**).

Unlike Athenian, Corinthian, and Laconian ceramics, East Greek vases have been far less subjected to painter attribution and connoisseurship, and there has been a healthy reluctance to speak too readily of artistic personalities. Kardara listed five of the British School's WGS sherds (**2–6**) in her 1963 publication of what was still at the time considered to be Rhodian vase-painting. Neither her chronology nor typology is today considered valid, but her attributions have been included here where relevant.[8] Lemos (1991, 2000) has made substantial progress in categorizing Chian vases based on the known published evidence, and her attributions by style, and further by group, have been followed here (i.e. Grand Style, Chalice Style, Animal Style, Sphinx and Lion Style, Black-Figure Komast Chalices).[9] Fikellura

[8] It should further be noted that her measurements differ in some cases significantly from mine, but her catalogue descriptions and attributions have enabled secure identifications.

[9] Lemos 1991, *passim*; 2000, 380–4, for Chian and other East Greek; and see earlier Boardman 1967, 156–61, for the classification of Chian to date.

and Clazomenian vases have also been attributed to painters and/or groups by R.M. Cook, with some recent revisions by others (esp. Schaus 1986); luckily he was aware of our single example of each category in the School's collection, which he attributed to the Lion Group and Petrie Group respectively. Additional attributions have been made despite the fragmentary nature of some of the pieces. It is hoped that these few specimens will supply a few missing pieces to the Naukratis puzzle and increase our knowledge ever so slightly of East Greek pottery as a whole.

Catalogue

The vases and fragments are presented and ordered by fabric and/or stylistic group, and within those roughly by chronology. Each entry provides, where known, the British School inventory number, shape, provenance, or acquisition history, dimensions, publication history; a basic description of decoration and iconography, including use of incision and added colour, attribution, and date; and, where necessary, a brief commentary and comparanda. The condition of the object is noted where considered unusual or informative. The person responsible for the attribution is named in square brackets. The letters at the start of some museum inventory numbers represent the following categories: A = pottery, K = Kynosarges. The unnumbered sherds from Naukratis or elsewhere belong to the School's sherd collection, although some are now kept or displayed in the School's museum. To avoid confusion, previously unnumbered fragments retain that designation here; in future they may be referred to by the catalogue numbers here assigned. Dimensions are in centimetres; A and B denote sides of the object, I the interior, E the exterior. All datings are BC.

WILD GOAT STYLE

The style with its characteristic animal-style decoration was produced widely in the Greek east. For the fabrics see Jones 1986, 662; and the recent provenance studies of M. Akurgal *et al.* 2002. For the animals and their postures see Kinch 1914, 231–43. See R.M. Cook and Dupont 1998, ch. 8, where the types are discussed by region, esp. 32 for the somewhat confusing rival systems of classification; Boardman 1998, 142–4, with previous bibliography; R.M. Cook 1992; and now Kerschner and Schlotzhauer 2005, and Schlotzhauer 2006, for further revisions to the classification. For the finds from Naukratis, see Möller 2000, 127–30, itself a sensible introduction to terms and chronology. Early WGS is described as the 'formative stage' (R.M. Cook 1992, 256), and is not as well represented or understood as subsequent phases. Middle WGS represents the standardization of decoration, and the phase II has been connected with Miletos, *c.*625–600. Much Late WGS from the first half of the sixth century is thought to be North Ionian (e.g. Clazomenae), and is generally thought to have been inspired by Corinthian black-figure. The *horror vacui* expressed by the excessive use and range of filling ornament is recognized throughout.

1. Sherd 2. Closed vessel fragment, oinochoe or amphora. Deep pink clay. White slip. From Naukratis. H. (pres.) 8.7. W. (pres.) 9.5. Th. 1.0. Unpublished.

A, (above): goat striding right with head down, four-part closed rosette, dot rosette with concentric circles, cross with dotted squares, spiky rosette(?) under goat's tail; (below): part frieze, hanging partial rosettes. Red: goat body, band. White: band above and below(?). South Ionian (Milesian); Middle WGS (II); [Smith]; Late WGS [Villing, pers. comm.]. *c.*600–570 (or earlier).

1

The simple bands, grazing goat and diverse filler are all typical of Middle WGS; in general see R.M. Cook 1992; and Kerschner and Schlotzhauer 2005 (South Ionian). See krater fragments, from Lindos, with similar goat, composition and filling ornament; Blinkenberg 1931, no. 988, and pl. 46. For the large rosette see Schiering 1957, fig. 4 row 3 (3); Walter-Karydi 1973, 47 fig. 75; and Venit 1988, no. 11 (Alexandria 9476), and pl. 3. For the closed rosette see Schiering 1957, fig. 1 row 4 (2); Kardara 1963, 94 fig. 59, and 121 fig. 142 (Paris); Walter 1968, 76 fig. 46; Lemos 1991, 63 and 66 fig. 40 (middle) for the Chian version. For the dotted square cross, Kardara 1963, 269 fig. 257 is close although not exact; and Fairbanks 1928, pl. 34 no. 321.12. For the spiky rosette see Walter 1968, no. 621, and pl. 127 (from Rhodes?), and 75 fig. 45; Walter-Karydi 1973, no. 514 (Louvre, from Kamiros), and pl. 62; Dehl-von Kaenel 1995, pl. 59 no. 3434 *b*.

2. Sherd 4. Open vessel fragment. Heavy, grey clay, with inclusions. White slip. From Naukratis. H. (pres.) 7.3. W. (pres.) 7.6. Th. 1.2. Kardara 1963, 215 no. 12.

A: springing goat, looking back, hind leg of another; rosettes and half-rosettes cruciform rosettes. I: Black. Incised lines, perhaps representing a decorative pattern.[10] Red: goat hind quarter, chest/shoulder, bands above and below. White: bands above and below. Workshop of the London Vase [Kardara]; North Ionian/Late WGS [Smith]. *c.*600–570.

Kardara places this fragment in her 'mixed technique' style (1963, 199–248), and for the attribution see her 213–15. The springing goat, looking back, is associated with Late WGS. Cf. Walter-Karydi 1973, 143 no. 918 (Hermitage 17567), a North Ionian shoulder-neck amphora, from Berezan. For the goat in this position see Kardara 1963, 253–4; and R.M. Cook and Dupont 1998, 53–4. For the rosettes see Schiering 1957, fig. 3 (bottom left) and row 7 (2), and fig. 2 row 6 (1). Kardara 1963, pl. 13 β–γ; and Walter-Karydi 1973, 143 no. 900 (Palermo, from Selinus), and pl. 108.

2

3. Sherd 5. Dinos fragment. Pink/brown clay. Black, white and red on white slip. From Naukratis. H. (pres.) 8.9. W. (pres.) 7.1. Th. (body) 1.3. Rim, W. 4.3. Th. 2.0. Kardara 1963, 239 δ4.

A: remains of animal frieze, neck and wings of duck or goose. Vertical slashes/abbreviated tongues. Rim: cable pattern. Tongues on shoulder. Red: cable, bands, line inside rim. Incision: wings. Silhouette and Outline Groups [Kardara]; North Ionian/Late WGS [Smith]. *c.*600–570.

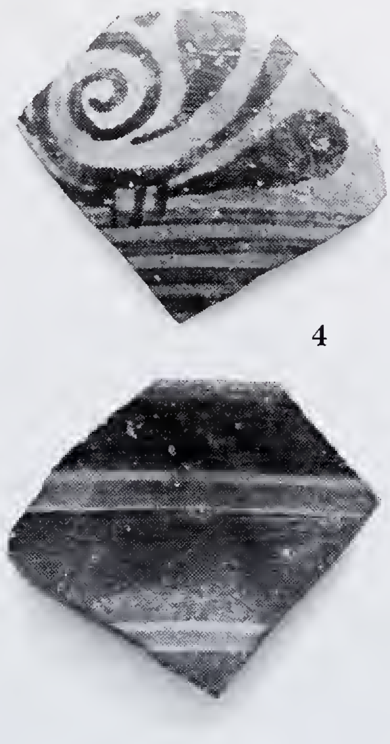
Kardara places this fragment in her 'mixed technique' style (1963, 199–248), and for the attribution see her 237–44. See Fairbanks 1928, 103 no. 308.6, and pl. 30, for cable pattern on a 'low bowl' fragment from the Temple of Hera at

[10] Both Alan Johnston and Robert Pitt have examined the incised markings and hesitate to identify intentional graffito lines. Rather, the incision seems to be decorative. Alan Johnston further specifies: 'one would normally expect a graffito to extend across the painted parts, which this clearly does not' (pers. comm.).

3

Naukratis; and 109 no. 320.9, and pl. 34, a shoulder fragment of a large krater, with the same composition as ours, also from Naukratis.

4. Unnumbered sherd. Hemispherical bowl. Rim fragment. Similar to previous but clay darker. White slip. From Naukratis(?). H. (pres.). 6.2. W. (pres.). 6.8. Th. 0.32. Kardara 1963, 243 no. 10.



4

A: black floral pattern. Series of thin bands below. I: black with two horizontal red bands on white slip. Silhouette and Outline Groups [Kardara]. North Ionian/Late WGS [Smith]. Early-mid sixth century.

Kardara places this fragment in her 'mixed technique' style (1963, 199–248); for the attribution see **3**. On the shape in general see Walter-Karydi 1973, nos. 1006–32. Cf. Gjerstad *et al.* 1977, pl. 3, although see also pl. 9 no. 3 ('technique mixte'); Fairbanks 1928, pl. 33.313–4 (florals on either side of handle); and Möller 2000, 244, for attributions; Boehlau 1898, 81–2 no. 8, and fig. 36 (drawing), from Naukratis. See also *CVA* Reading 1 (12), pl. 21, and nos. 19–25, for 'Camiran bowls', with greyish clay, cream slip, animal and floral decoration, dated to the early sixth century. The floral on Walter-Karydi 1973, no. 895, and pl. 111 (Berlin 2939, from Rhodes) is very close to ours; and see Dehl-von Kaenel 1995, no. 3438, from Selinus, with comparanda. For the Fikellura version see Schaus 1986, nos. 307–8.

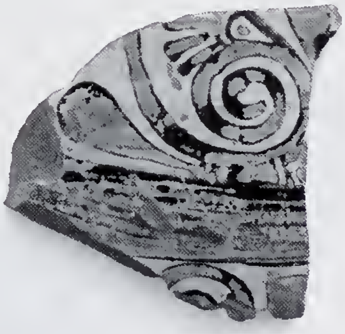
5. Sherd 6. Closed vessel (oinochoe?). Body fragment. Fabric similar to previous. Nice white slip. From Naukratis. H. (pres.) 6.5. W. (pres.) 4.8. Th. 0.5. Kardara 1963, 225 no. 36 (incorrectly identified as a mixing vessel).

5

A: feline paw (lion?) and large rosettes with scant incision. Meander below. School of the Silhouette and Incision Technique A [Kardara]. North Ionian/ Late WGS [Smith], *c.*600–550.

Kardara places this fragment in her 'mixed technique' style (1963, 199–248), and for the attribution see her 222–8; and. **3–4**. Cf. Walter-Karydi 1973, 143 no. 895 (Berlin 2939, from Rhodes), and pl. 111 (paw), and 143 no. 918, and pl. 112 (shoulder); *CVA* Oxford 2 (9), pl. 4 no. 45 (inv. G119.40), from Naukratis is similar, and see 78 ('Camiran style'). *CVA* Cambridge 2 (11), pl. 18 nos. 33 and 44 (inv. nos. N.94–6, 237; and 94–5, N.226) are also similar ('Camiran'). Fairbanks 1928, 109 no. 320.3 and 8 *a–b*, and pl. 34, belonging to large kraters, from Naukratis. For the lion as a subject in the WGS see Kardara 1963, 151–3, and 260–1; Kerschner and Schlotzhauer 2005, 16 and 24.

6. Sherd 3. Closed vessel (oinochoe or amphora). Body fragment. Somewhat worn. Pink clay with deep inclusions. White slip. From Naukratis (?). H. (pres.) 6.7. W. (pres.) 6.7. Th. 0.8. Kardara 1963, 240 no. 8 (oinochoe).

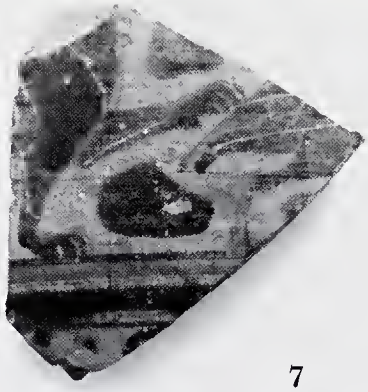


6

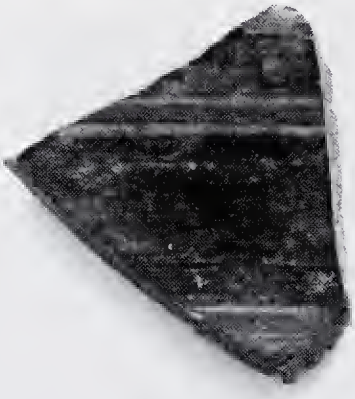
A, (above): black floral pattern of volutes and palmettes; (below): top of volute. Thick black band between. Silhouette and Outline Groups [Kardara]; North Ionian/Late WGS [Smith]. *c*.600–550.

Kardara places this fragment in her 'mixed technique' style (1963, 199–248), and for the attribution see 237–44; and nos. **3–5** above. For the down-turned spiral see Petrie 1886, pl. 13 no. 2; and Gardner 1888, pl. 7 no. 5 (bowl). Cf. Walter-Karydi 1973, 143 no. 895 (Berlin 2939, from Rhodes), and pl. 111 (shoulder ornament); and Boardman and Hayes 1966, no. 589 for bold black floral on a Rhodian amphora. For a Fikellura version see Venit 1988, no. 157 (Alexandria 9517). Gjerstad *et al.* 1977, pl. 14 no. 2, and 32–3, bears a similar design as decoration on the shoulder of an oinochoe ('technique mixte'); and see from Naukratis: *CVA* Edinburgh 1 (16), pl. 3 (1886.518.2e); *CVA* Reading 1 (12), pl. 22 nos. 14 (26.ii.44) and 15 (26.11.45), probably both oinochoai; *CVA* Oxford 2 (9), pl. 2.5–6 (G119.1), an oinochoe. Dehl-von Kaenel 1995, no. 3430, an oinochoe fragment from Selinus, is very close. Cf. **4** above.

7. Unnumbered sherd. Closed vessel (oinochoe?). Body fragment. Orangish clay. H. (pres.). 6.1. W. (pres.) 5.3. Th. 0.9. Unpublished.



7



A: black-figure animal frieze: lion or panther with raised paw, folded wing, rear and part leg of bird; part another frieze below. I: similar to previous. Red: feline body and chest. White: bands below. Incision: feline body and chest. Late WGS/North Ionian [Smith], *c*.600–550.

For a similar lion see Fairbanks 1928, pl. 34 no. 320.8; and *CVA* Philadelphia 2 (29), pl. 4 no. 5 (E179.B1), from Naukratis, is very like ours, although decorating the handle-plate of a column-krater. See also *CVA* Oxford 2 (9), IId, pl. 4 no. 45 (G119.40), attributed to 'Camiran B', from Naukratis; and Venit 1988, no. 31 (Alexandria 9339), and pl. 8, an amphora or oinochoe fragment which is quite similar. For the lion as WGS subject see no. **5** above; and for the panther see Kerschner and Schlotzhauer 2005, 24.

FIKELLURA

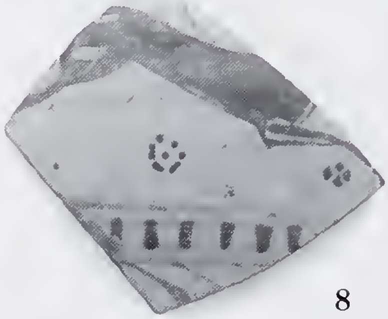
The best and most up to date general introductions to Fikellura are R.M. Cook and Dupont 1998, ch. 10 and Boardman 1998, 147–8, who quite correctly discusses it under the heading 'Milesian'. For painters and groups see R.M. Cook 1933–4, who arranges his catalogue in a roughly chronological sequence, and appreciates the 'makeshift' nature of the evidence (p.

4); and Schaus 1986. For the relationship to the WGS see R.M. Cook 1978–80; 1992; 1993; and 1999, each with relevant bibliography; and the important recent discussion of Schlotzhauer 2006, based on finds from Miletos. More detailed provenance studies appear in Akurgal *et al.* 2002. Most are dated *c.*535–525 or later, but our fragment is slightly earlier.

8. Sherd 1. Body fragment. Belly amphora. From Naukratis. H. (pres.) 8.9. W. (pres.) 9.9. Th. 0.6. R.M. Cook 1933–4, 6 no. B9; Schaus 1986, 255 no. 35, and pl. 15 *c*; Möller 2000, 244 no. 4.

A: part of leaping goat. Dot rosettes. Band and crescents below. Goat belly reserved. Fikellura. The Lion Group (Group B) [R.M. Cook]; Probably Altenburg Painter [Schaus]. *c.*550–540.

On the Lion Group and its dating see R.M. Cook 1933–4, 7–8. Clay and slip are typical. Our fragment likely formed part of an animal frieze; see ibid. 5 no. B1 (British Museum B118), belonging to the same group. For filling ornament see Schaus 1986, 264 figs. 1. 2 and 10; and cf. Walter-Karydi 1973, 136 no. 642, pl. 88, also for ornament. For the band decoration, see Schaus 1986, 265 fig. 3. 1; and R.M. Cook 1933–4, 5 no. B2 (British Museum B119), in the same group. For the crescents: Schaus 1986, 266 fig. 4. 1.



8

CHIAN

For general information on Chian pottery consult R.M. Cook and Dupont 1998, 46–51 and ch. 9, and Boardman 1998, 144–6, both with bibliography. Lemos 1991 is the most current and thorough study of the published evidence to date, classified by technique and style. Williams 1983 publishes much of importance from Aegina. For the cultural and archaeological contexts see Boardman 1999, and for the chronology of all Chian decorated pottery Lemos 1991, 181–90. The styles represented here appear throughout the sixth century.

9. Unnumbered sherd, now missing. Body fragment. Chalice. From Old Smyrna (siege mound). H. (pres.) *c.*4.0. W. (pres.) 3.1. Lemos 1991, 322 no. 1457, and pl. 192.

A, parts of two friezes, (upper): body and leg of lion to right, half-rosette; (lower): head and neck of sphinx to left, tail of another animal (feline or sphinx). Part rosette. Incision: lion body and mane, sphinx body, face and hair. Sphinx and Lion Style [Boardman]; and Group A [Lemos]. *c.*600.

Boardman (1967, 166 n. 4) uses this sherd and its context to date the beginning of the Sphinx and Lion Style.[11] See also Lemos 1986, 244 n. 28; 1991, 186–7; she considers Group A to represent the best

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[11] I am grateful to Anna Lemos for bringing this to my attention.

of the style (1991, 147). On the British School excavations at Old Smyrna see J.M. Cook and Nicholls 1998, with bibliography; Boardman 1999, 95–7, esp. n. 255; and here n. 2. For Chian pottery from the site, see J.M. Cook 1965, 138–42; and Lemos 1991, 204–5.

10. Sherds 18 *a–b*. Two neck(?) fragments (not joining). Oinochoe(?). From Naukratis. 18 *a*: H. (pres.) 3.9. Th. 0.35. 18 *b*: H. (pres.) 5.8. Lemos 1991, 320 no. 1430, and pl. 185; Walter-Karydi 1973, 138 no. 706, and pl. 97.

11

10

18 *a*: part of lion and sphinx to right. 18 *b*: sphinx and tail and haunch of another animal to left. Both: rosettes and half-rosettes, dividing bands. Red: lion bellies, front of back legs. Incision: lion mane, face, body; sphinx face, hair, wings, body; rosettes. Sphinx and Lion Style (Group D, Stage 2) [Lemos]. First half of the sixth century.

For the shape, which is unusual in this style, see Lemos 1991, 136. The animal-figure decoration is standard, thus the name; see Lemos 1991, 140–1; Boardman 1998, 145. The rosettes are more carefully drawn than some, although Lemos might disagree; see 1991, 148. For dividing bands of the same type see Lemos 1991, 144 fig. 79. 5–6. The lion's body is drawn as Lemos 1991, 321 no. 1434 (Ras el Bassit), and pl. 185. Possibly from a stand or other cylindrical shape (see here n. 7).

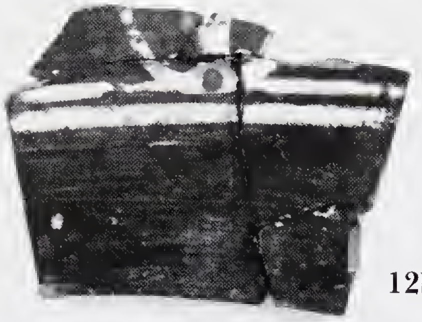
11. Sherd 9. Rim fragment. Chalice. Fine clay. White slip. From Naukratis. H. (pres.) 5.5. W. (pres.) 5.2. Th. 0.2. Unpublished.

A: dot border on white slip background. I: red and white upturned lotus chain on black background, with large wheel-rosette between. Perhaps the Chalice Style [Smith]; perhaps the Group of the Antithetical Sphinxes [Lemos, pers. comm.]. Mid-sixth century.

For the simple dot rim in this style see Lemos 1991, 129 fig. 71.1, and also 294 no. 952 (Thessaloniki 14305), and pl. 127; and in general 121–2. For similar interior decoration see Lemos 1991, 307 no. 1248 (from Old Smyrna), and pl. 161 (Chalice Style); and 283 no. 799 (from Berezan), and pl. 108 (Grand Style); and her 124, fig. 66 no. 928 (Tocra 784) is similar but not the same, although see also 130. On the Group of the Antithetical Sphinxes, see Lemos 1991, 130 no. 1.

12. Sherd 14. Five body fragments, joining (reconstructed). Chalice. Fine clay. White slip. From Naukratis. H. (pres.) 3.9. W. (pres.) 5.0. Th. 0.21. Lemos 1991, 293 no. 922, and pl. 122.

12a

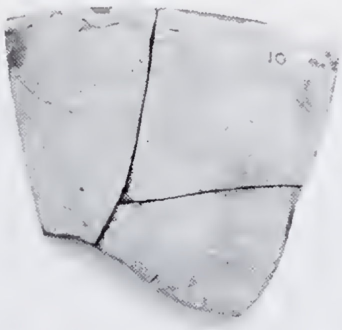


12b

A: Wing, neck and part body of sphinx to left. I: traces of red and white floral, double white horizontal lines on black background. Red: sphinx body and neck. Chalice Style [Lemos]. *c.*575–550.

The sphinx is not an uncommon subject, and its leftward orientation is standard; Lemos 1991, 125–7.

13. Sherd 10. Three fragments, rim and part body, joining (reconstructed). Chalice. Fine clay. White slip. From Naukratis(?). H. (pres.) 4.0. W. (pres.) 4.7. Unpublished.

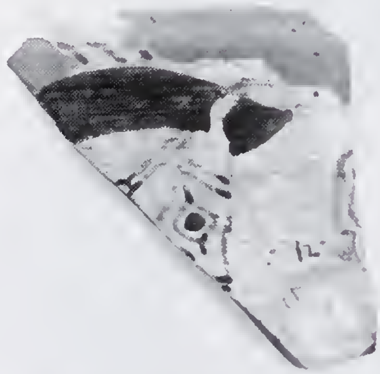


13

A: white. I: two white horizontal bands, elaborate red and white triangular design above, and two concentric circles below. Animal Chalice or Chalice Style [Smith]; Group of Antithetical Sphnixes [Lemos, pers. comm.]. Mid-sixth century.

Not enough remains to make certain attribution, and there are no known exact parallels of the interior design, which almost seems architectural; cf. Boardman 1967, 90 no. 50, and pl. 17, from Emporio, although appreciably later. For a more abstracted version see Lemos 1991, 270 no. 683 (Berlin 3150, from Naukratis), and pl. 90 (Animal Chalice Style); and 293 no. 927 (Tocra 783), and pl. 124 (Chalice Style). Venit 1988, no. 58 (Cairo 26137), and pl. 14, labels a similar design in the WGS 'a volute complex'. For the group see **11**.

14. Sherd 12. Rim fragment. Chalice. Fine clay. White slip. From Naukratis. H. (pres.) 5.2. W. (pres.) 4.9. Th. 0.35. Lemos 1991, 282 no. 790, and pl. 103.



14

A: part horse head with bridle, in profile to right. Part rounded rosette. SS pattern on rim. I: large rosette on black background. Red: mane, rosette centre. White: inside rim, rosette 'petals'. Grand Style (Group A) [Lemos]. Second quarter of the sixth century.

The Grand Style was first named by Boardman, and is characterized by its polychrome decoration, as well as its scenes of daily life and mythological episodes (see Lemos 1991, 94–5). Boardman also notes that the category is well represented at Naukratis (1998, 145). Lemos believes our fragment belongs to a riding scene, of which there are more

than a few examples extant (1991, 101–2). For the interior rosette see Lemos 1991, 110 fig. 61 (top right); 270 no. 674 (Istanbul 2267, from Pitane), and pl. 87; and 279 no. 769 (Cambridge, from Naukratis), and pl. 101.

15. Sherd 15. Rim fragment. Chalice. Fine clay. White slip. From Naukratis. H. (pres.) 4.8. W. (pres.) 4.4. Th. 0.2. Lemos 1991, 282 no. 792, and pl. 104.

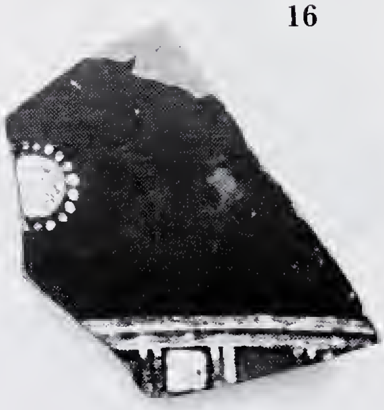
15

A: Animal head? Part nose and eye. Part rosette. Part another rosette or rounded object or boarder below. Above: horizontal row of dots between dilute lines. White: dots below. Incision: rosette. I: very well-preserved red and white floral on black background. Top rim reserved in natural clay. Grand Style (Group A) [Lemos]. Second quarter of the sixth century.

Lemos could not identify the iconography, although the figure may be Herakles with his lion-head helmet; see Lemos 1991, 106 fig. 59, and 276 no. 741 (British Museum 1888.6–1.519, from Naukratis); and on the subject, 108. The rosette and rim ornament are neatly drawn; see Lemos 1991, 109–10.

16. Sherd 13. Body fragment. Chalice. Fine clay. White slip. From Naukratis. H. (pres.) 6.5. W. (pres.) 5.4. Th. 0.4. Lemos 1991, 282 no. 791, and pl. 104.

16



A: striding draped male and foot of draped female, both to right. In field, rosette and dotted square. Another rosette in field, or wreath held by figure above. Top of cable pattern/guilloche below. I: white dot rosette with bold centre, and alternating red and white squares, on black back ground. Grand Style (Group A) [Lemos]. Second quarter of the sixth century.

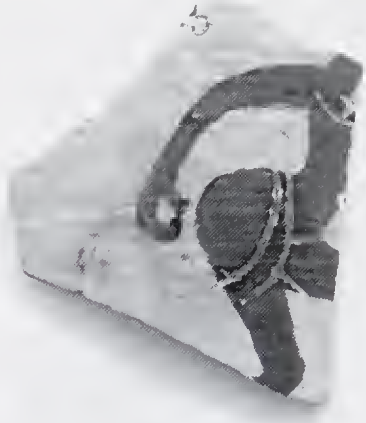
Lemos places our fragment with processional scenes, which she suggests in general 'must have some sort of religious connotation' (1991, 100). For dress and footwear in this style see Lemos 1991, 96–8, esp. 98 on this fragment. Wreaths are sometimes held by processional figures in Chian iconography; Lemos 1991, 100 (Grand Style) and 126 (Chalice Style). The guilloche patterns originate in the WGS, on which see Lemos 1991, 48 fig. 26 *a*.

17. Unnumbered sherd. Body fragment. Chalice. Fine clay. White slip. From Naukratis. H. (pres.) 3.1. W. (pres.) 5.3. Th. 0.3. Edgar 1898–9, 58 (at no. 2); Walter-Karydi 1973, 140 no. 800, and pl. 96; Lemos 1991, 282 no. 789, and pl. 103; and 99 fig. 53 (drawing); Villing 1998, 161 fig. 14; Lemos 2000, 389 fig. 276 (middle; drawing).

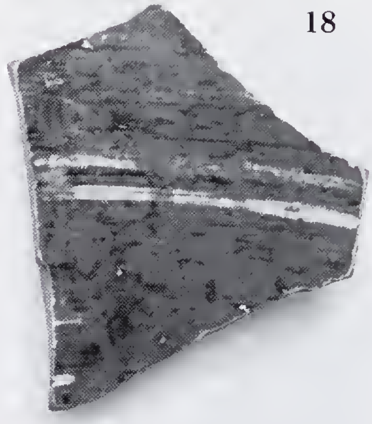
A: part head, eye, and helmet of Athena to left.

'Snake' on helmet, reserved dots terminating in spiral. Remains of spear. Red/white: helmet. I: black, traces of red and white floral. Grand Style [Lemos]. Second quarter of the sixth century.

17



18



For the subject in this style see Lemos 1991, 107 no. 2. For another possible Athena in the Chalice Style see Lemos 1991, 292 no. 899 (British Museum 1886.6–1.493 *e*, from Naukratis), and pl. 120, and see 131. On her cult and iconography in Chios see Graf 1985, 44–9; Villing 1998, 147–68; and in general Deacy and Villing 2001.

18. Sherd 16. Body fragment. Chalice. Fine clay. White slip. From Naukratis. H. (pres.) 3.8. W. (pres.) 3.1. Th. 0.2. Lemos 1991, 329 no. 1560, and pl. 199.

A: Legs, buttocks, right shoulder and arm of komast dancing right, slapping bottom, 'snapping' fingers. I: black with red (misfired?), two white horizontal bands. Incision: 'padding', wreath. Black-Figure Komast Chalice (Group E) [Lemos]. Mid-sixth century.

Dancing figures of this type originate in Corinthian black-figure, but are found also in Athens, Laconia, Boeotia, East Greece, and West Greece. Lemos believes the Chian version is borrowed from Corinth, and places the sizable number of Chian examples into stylistic groups (1991, 169–73). Although Lemos calls the garment worn by the figure a 'loin-cloth' (1991, 164), it may well be a type of padding attached round the buttocks; similarly the band across the chest, barely visible here, is very likely a wreath. On komasts in general see Smith 2007, with bibliography. The 'snapping' hand position is found primarily in Chian komast scenes (e.g. Lemos 1991, 173 fig. 99, and 330 no. 1582 [Kiev, from Olbia], and pl. 202), but is also demonstrated by komasts decorating the shoulder of a Chalcidian amphora (Leiden 1626); Boardman 1998, 238 fig. 472. A wreath or band across the chest is visible on many Chian and Fikellura komasts; Smith 2007, 58. For close comparanda see Lemos 1991, 172; and for komasts of other fabrics in the British School collection see Smith 2003, 351, and nos. 49 (Corinthian), 50 and 53 (Boeotian), 60 (Attic).

CLAZOMENIAN

For Clazomenian, a version of East Greek black-figure produced in North Ionia, see R.M. Cook and Dupont 1998, ch. 12; Boardman 1998, 148–9; and recently Özer 2004. Classification by groups and painters is established in R.M. Cook 1952; and see *CVA* British Museum 8 (13). On other Ionian black-figure, see J.M. Cook 1965; and for the sarcophagi which share the name and perhaps area of manufacture, and their relationship to vase-painting: R.M. Cook 1981; and Boardman 1998, 148–9. Most are dated *c*.550–525.

19. Sherds 3 *a–b*. Two joining fragments. Slim amphora. Red clay. 3 *a*: H. (pres.) 12.2. W. (pres.) 8.4. Th. 0.45. 3 *b*: H. (pres.) 9.0. W. (pres.) 6.9. Th. 0.4. R.M. Cook 1952, 129 no. B25.

A: remains of three crescent bands. Scales above. White: some crescents, dots in scales. Petrie Group [R.M. Cook]. *c*.540–530.

The Petrie Group slim amphorae were mostly found at Tell Defenneh; R.M. Cook 1952, 128–30; Möller 2000, 253; and Özer 2004, 203. In his lists, Cook provisionally suggests that our fragments belong to the same vessel as a fragment in Heidelberg, and the crescents are indeed similar; see *CVA* Heidelberg 1 (10), pl. 3. 2. For the scales see Walter-Karydi 1973, 145 no. 956, and pl. 128 (Rome, Capitoline Museum 329); *CVA* British Museum 8 (13), pl. 9 (bottom right); and Özer 2004, 207–8.

19

OTHER/'BOWLS'

On East Greek bowls of these and related types, see R.M. Cook and Dupont 1998, ch. 6; Boardman 1998, 51, 141–2; and Mannack 2002, 91, each with bibliography. Recent provenance studies are found in Akurgal *et al.* 2002, 63–72 (Kerschner). Bird Bowls appear as a series *c*.700 (Late Geometric/Subgeometric), but begin to be replaced by the Rosette Bowls during the last quarter of the seventh century, lasting well into the sixth (R.M. Cook 1997, 110–11).

20. Unnumbered sherd. Rim and body fragment. Cup. H. (pres.) 5.9. W. (pres.) 5.8. Th. 0.4. Unpublished.

A: part cross-hatched diamond, three vertical lines on either side, thin lines below. Black below. Bird Bowl [Smith]. Late seventh century.

On the type see Kinch 1914, 134–5; Walter 1968, 58, and nos. 466–82. Cf. Walter 1968, 118 no. 476, and pl. 85; Fairbanks 1928, 115 no. 327.1, and pl. 36, from Naukratis; Boardman 1967, nos. 448–9, from Emporio, and discussion 132–4. For a more pristine example: Boardman 1998, fig. 138 (Oxford 1928.313), identified as North Ionian (cf. Jones 1986, 664); although R.M. Cook advises caution regarding specific location of manufacture (Cook and Dupont 1998, 26).

20

21

21. A472 (K217) Cup. From Kynosarges(?). Reconstructed from fragments, with some conservation and repainting. H: 5.5. D. rim: 13.0. base: 6.2. Unpublished.

A–B: single seven-dot rosette in centre of reserved band. Black rim and wide black band below. Rays above foot. Foot black. Beneath: single black dot inside black band. I: black with single red band *c.*1 cm. below rim. Double red bands with black vertical slashes inside bowl. Tondo: reserved with diluted brown, large dot, and circle. Rosette Bowl [Smith]. Sixth century.

See Kinch 1914, 135–6; Boardman and Hayes 1966, 53–7; and Walter 1982, 10–11, with bibliography. Clay analysis confirms North Ionian (at or near Clazomenae) as a place of manufacture; R.M. Cook and Dupont 1998, 27 n. 2. Base rays may indicate a date earlier in the century; see Boardman 1998, 141; and R.M. Cook and Dupont 1998, 27–8, and fig. 6.2, where the rays have disappeared; and Boardman and Hayes 1966, no. 723 and 725 (for rays). The former 'K' inventory number would normally denote a find from the School's excavations at Kynosarges during the late nineteenth century, but it is uncertain in this case; for Athenian black-figure pottery and other finds from Kynosarges in the School's collection see Smith 2003, 367–8, and Coldstream 2003.

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Appendix: An Attic Phiale Mesomphalos

A series of phialai, considered products of Attic manufacture, are dated to the late sixth century (Boardman 1974, 178–9; Cardon 1978–9; Cohen 2006, 88–9, and no. 18). Although some were discovered on the Acropolis in Athens, others have been identified from Delos, Eleusis, possibly Rhodes, Naukratis, and elsewhere (Boardman 1968, 14; Kokkou-Vyridi 1999, 78–9; Tsingarida 2008*a*, 187–93). A recent find from the Athenian Agora (portraying cows), should be added to the existing bibliography (Camp 1996, 250–1, and no. 34; fig. 9; pl. 75). Their technique of decoration combines red and white over a black background, with little or no incision, and has been related to both black-figure and red-figure, as well as to the 'Six Technique' (Six 1888; Nichols 1902, 335; Walters 1973, 394; Kokkou-Vyridi 1999, 77; Cohen 2006, 88). The phialai, however, might best be separated into their own category; as Boardman has noted, 'they often avoid the Attic "Six Technique" of incision' (1968, 14; and see Cohen 2006, 89). Boardman has further observed the similarities of technique, shape pattern, and interior decoration with the vase-painting of Chios, and long ago Luschey posited that an Ionian introduced the phiale with polychrome decoration to Athens (Boardman 1968, 14–15; Luschey 1939, 31–7; and see Lemos 1991, 301 nos. 1073–81; Tsingarida 2008*b*, 105 n. 2, and 109). At the same time, both the 'light on dark' technique of pottery decoration as well as polychrome painting had long been practised to some extent in Athens (Brann 1962, 26–30). In addition, the superficial resemblance of the Attic phialai to

East Greek Vroulian ware should also be mentioned (Kinch 1914, 167–86; R.M. Cook and Dupont 1998, 114–15). Perhaps most often associated with libations, the shape itself might also serve as a simple drinking cup, or function as a votive or funerary offering. Regardless of alleged inspiration or exact purpose, a few phialai are decorated with human figures, animal life or marine themes; those with floral decoration, such as **App. 1**, are undeniably related to metal vessels; indeed the attractive shape itself is thought to be both 'metal and eastern' in origin (Boardman, 1968, 14; cf. Sparkes and Talcott 1970, 105–6; Tosto 1999, 131 esp. n. 536). Recent discoveries at Eleusis considered in comparison with others from excavated contexts suggest a date range of *c.*520–480 (Kokkou-Vyridi 1999, 77–9; Tosto 1999, 131). There is little doubt that the group as a whole might well benefit from a more comprehensive and updated treatment. For recent suggestion of the polychrome phialai belonging to the workshop of Nikosthenes see Tsinagarida 2008*b*, esp. p. 105.

App. 1. A50. (FIG. 22 *a–b*). Phiale mesomphalos. Very good condition. Deep pinkish clay. D. (rim) 17.1, (omphalos) 3.7. H. 4.5. Unpublished.

E: wide black band around rim and under body. I: white and red 'floral' pattern on black background: double row of radiating tongues with cream coloured dots at top, chevrons inside lip. Red: omphalos, inside tongues. White: outline teardrops, chevrons, slashes surrounding omphalos. Polychrome; Six Technique [Smith]. Late sixth century (*c.*520–500).

Luschey 1939, 95–6, and nos. 3–7, are possible parallels, and see 99, 108–10, 151–2. Dugas 1930, 22–3, and pls. 52 and 70, esp. 644, for a motif similar to ours, although not as well preserved and not the same. See also Kunze-Götte *et al.* 1999, 31 no. 77. 1 (inv. 698), and pl. 18, 4–5, from the Kerameikos, displaying a wreath of myrtle. For a Chian vessel with similar interior decoration see Lemos 1991, 301 no. 1076 (from Histria), and pl. 149. The relatively small size is typical of the group; Cohen 2006, 89. For polychrome Six's Technique, see Tsingarida 2008*b*.

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INDEXES

compiled by Graham Shipley

The introductory note to the indexes in volume 103, and earlier introductory notes referred to there, apply. Unless otherwise qualified, 'Coldstream' indicates J.N. Coldstream.

aDNA	ancient DNA
Ar	Archaic
BA	Bronze Age
BSA	British School at Athens
C4	4th century BC
C5	5th century BC
C6	6th century BC
C7	7th century BC
Cl	Classical
EC	Early Cycladic
EHl	Early Hellenistic
EIA	Early Iron Age
EM	Early Minoan
Hl	Hellenistic
LBA	Late Bronze Age
LH	Late Helladic
LIA	Late Iron Age
LM	Late Minoan
MBA	Middle Bronze Age
Med	Medieval
MM	Middle Minoan
Myc	Mycenaean
SH	*Späthelladisch* (see p. 184 for explanation)

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PLATES

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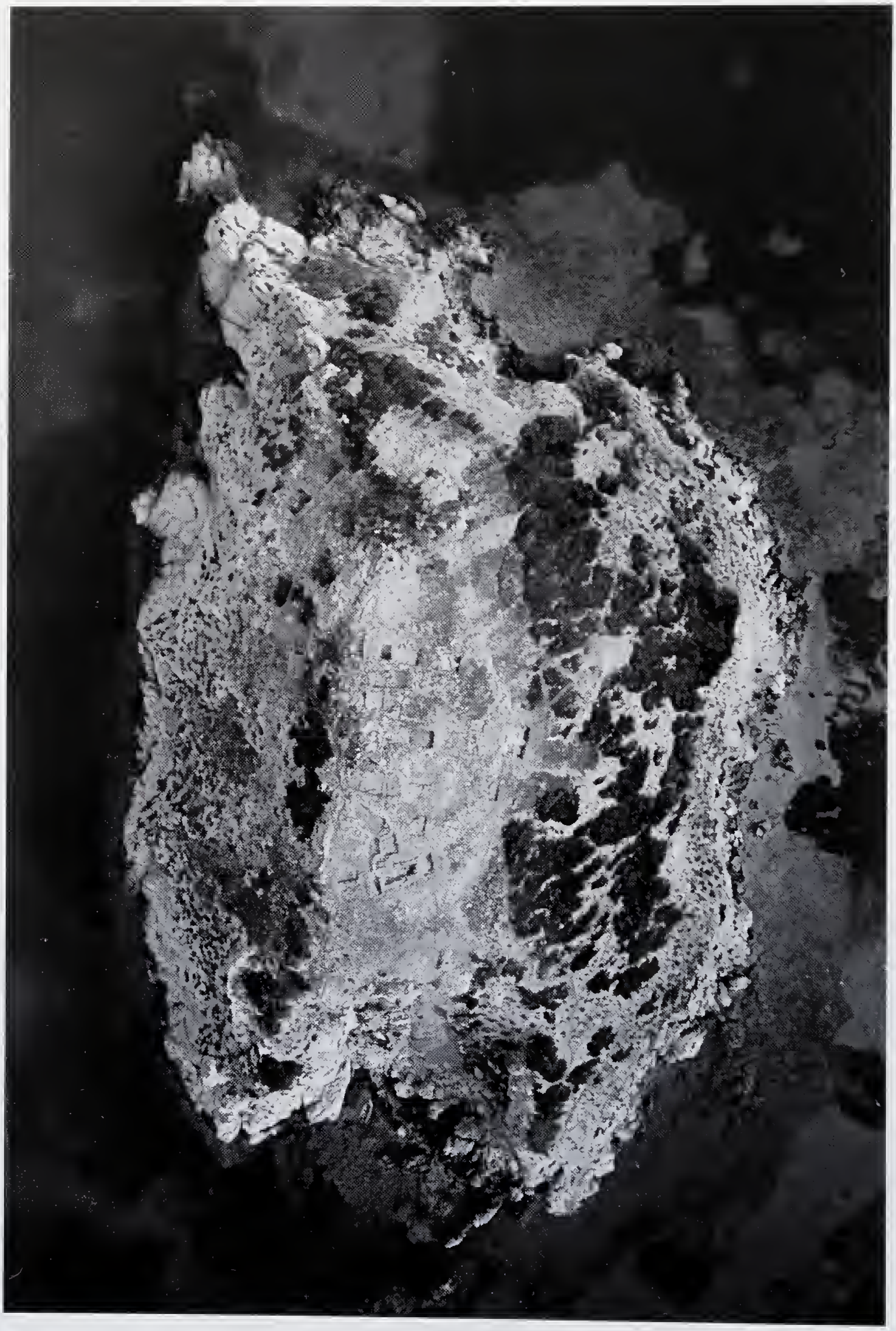
THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS
(*a*) Helicopter view of Dhaskalio island (right) and of Dhaskalio Kavos on Keros (left), seen from the north. (*b*) Dhaskalio, seen from the north, showing early Bronze Age walls.



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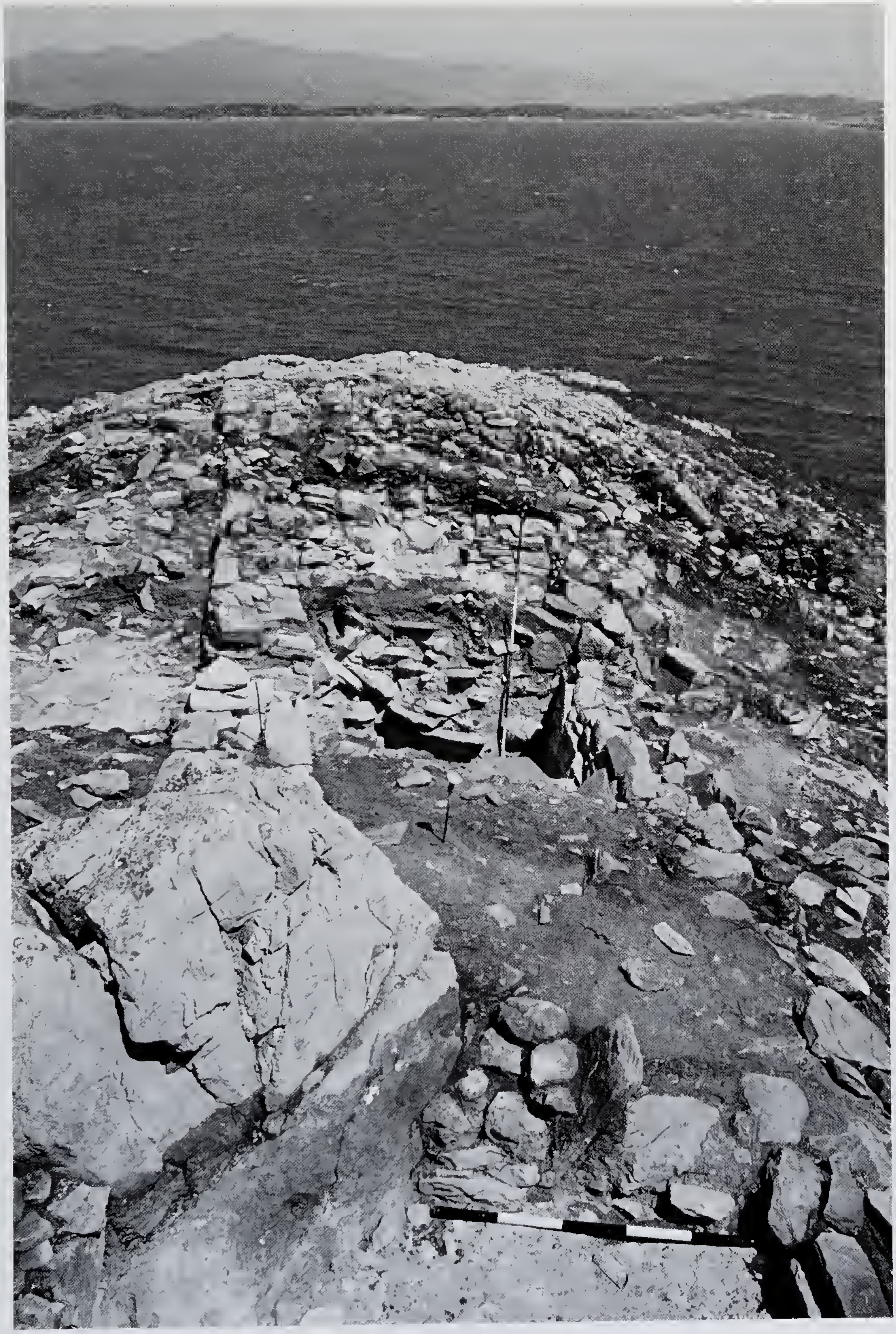
THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS
Helicopter view of Dhaskalio, showing excavation trenches near the summit.



RENFREW ET AL.
THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS
The Hall at the summit of Dhaskalio during excavation, seen from the south, with rock outcrop in the left foreground.

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THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS
(*a*) The Summit Enclosure seen from the north (50 cm scale). (*b*) Early Cycladic street (left) in Trench XXI running up to and under the south wall of the Byzantine church, with EC walling (right).

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THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS

(*a*) The summit area looking south, with Early Cycladic buildings; the north and south walls of the Byzantine church run obliquely, indicated by horizontal ranging rods. (*b*) Tumbled building stones in Trench XVIII, below the Hall, seen from the north-east (50 cm scale).

RENFREW ET AL.
THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS
Pottery: (*a*) of phase B (Kastri period) with tankard (1) and depas handle (3); (*b*) of phase C (EC III).
(See TABLE 1).

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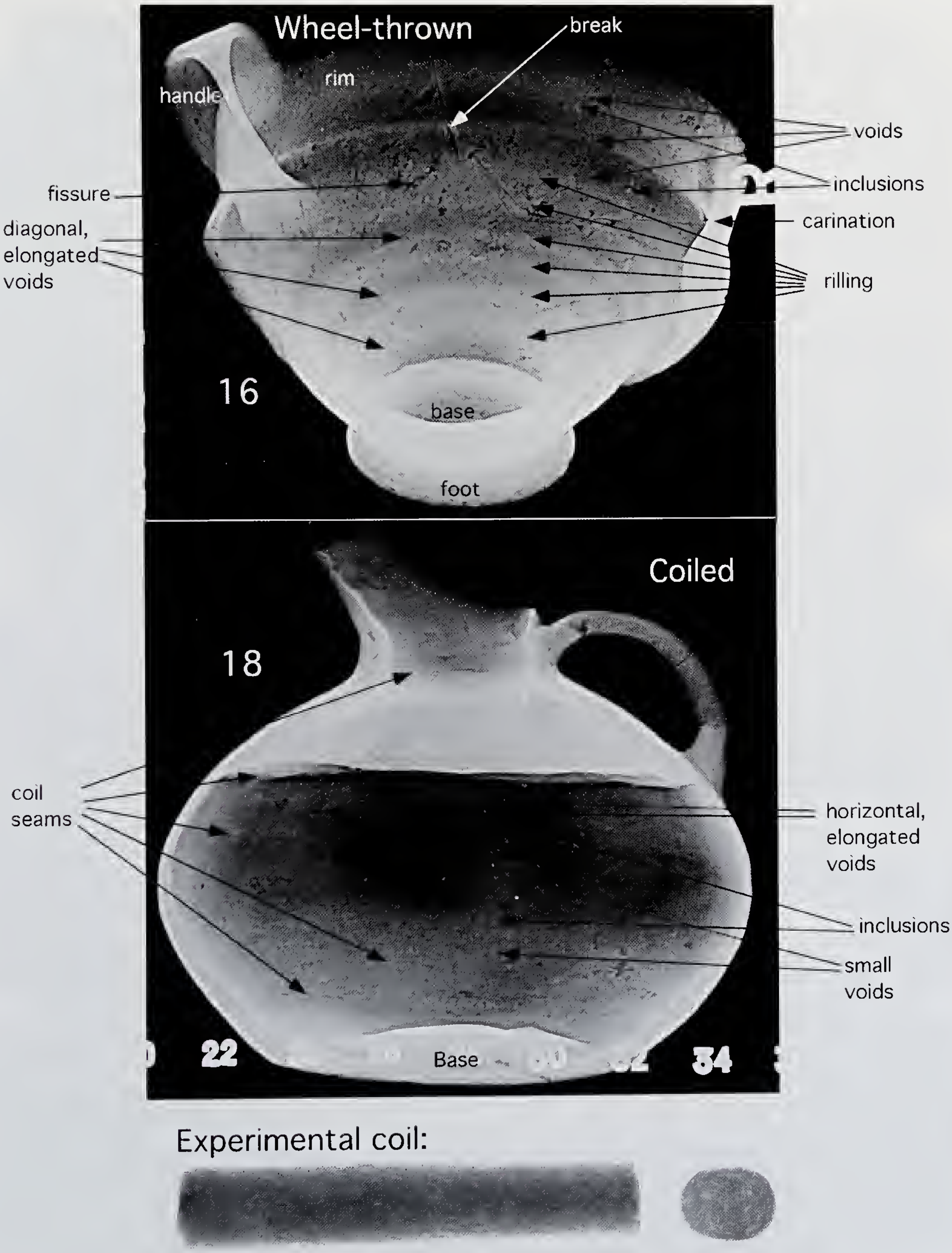
THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS
(*a*) Axe-adze, (*b*) chisel of copper or bronze from the Dhaskalio hoard; (*c*) ceramic tuyères, probably used in metalworking, found in Trench I (scales in cm.).

RENFREW ET AL.
THE EARLY CYCLADIC SETTLEMENT AT DHASKALIO, KEROS
Marble schematic figurines of Dhaskalio sub-variety (scale in cm.).



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X-RADIOLOGY OF KNOSSIAN BRONZE AGE VESSELS
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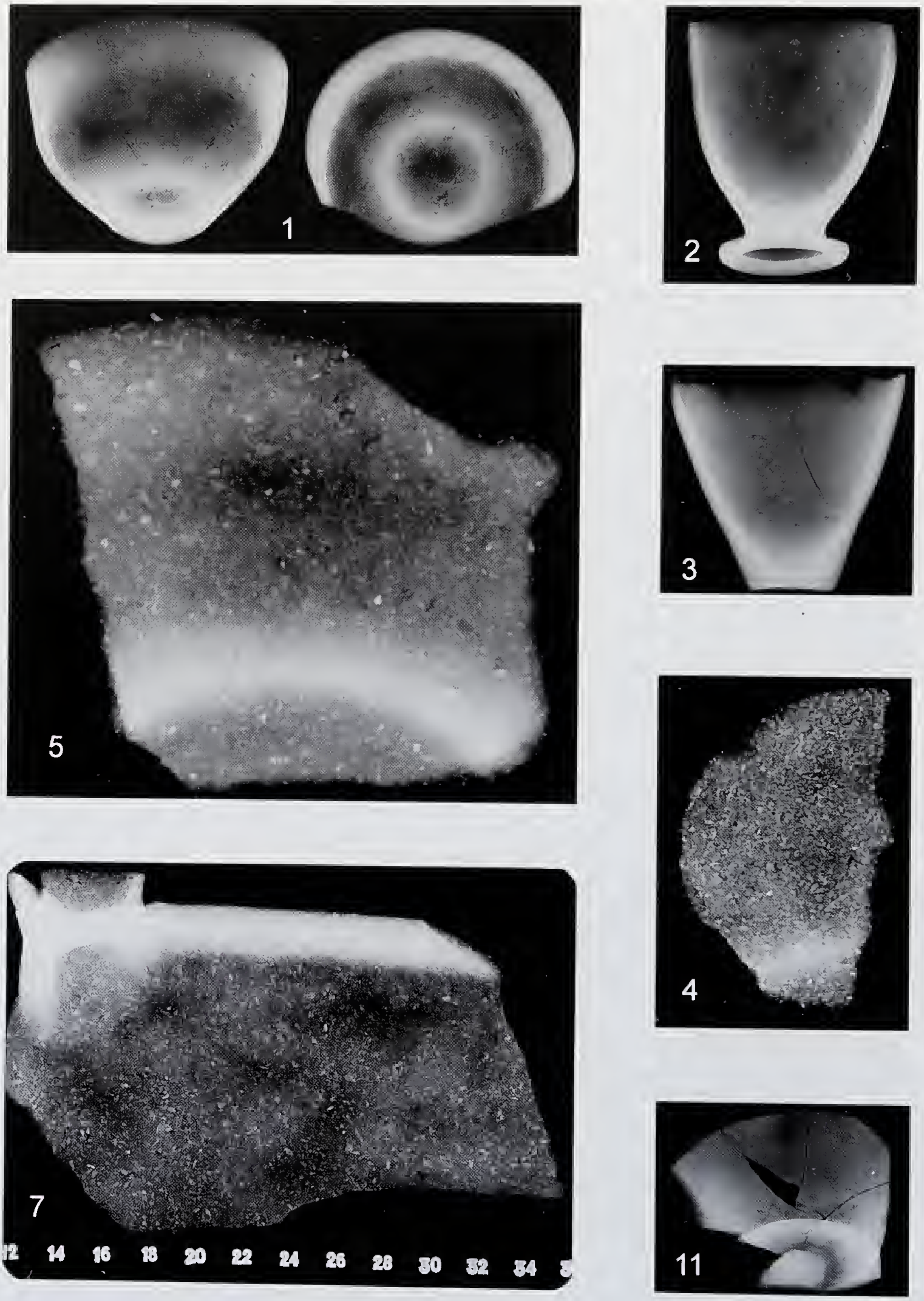

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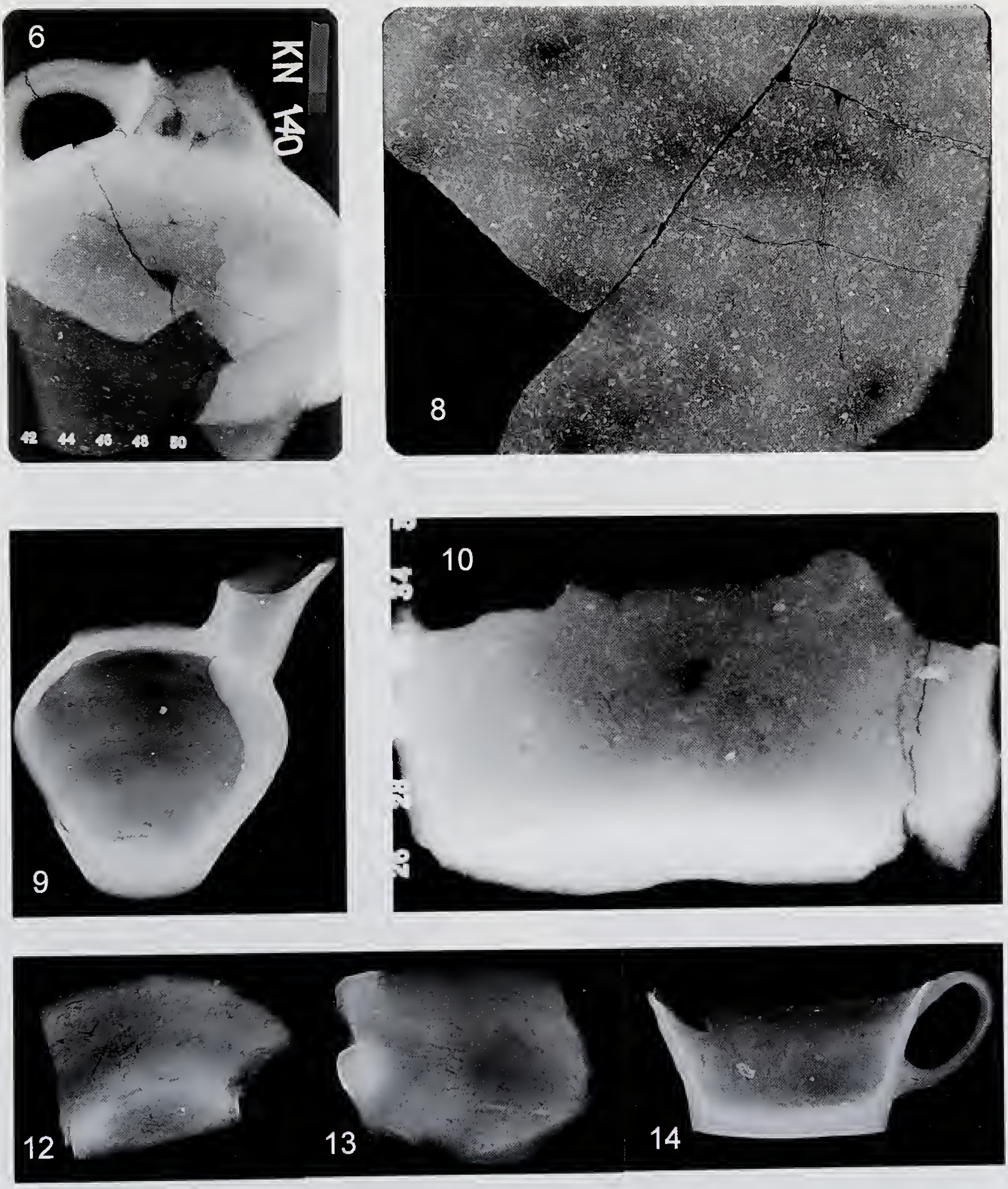

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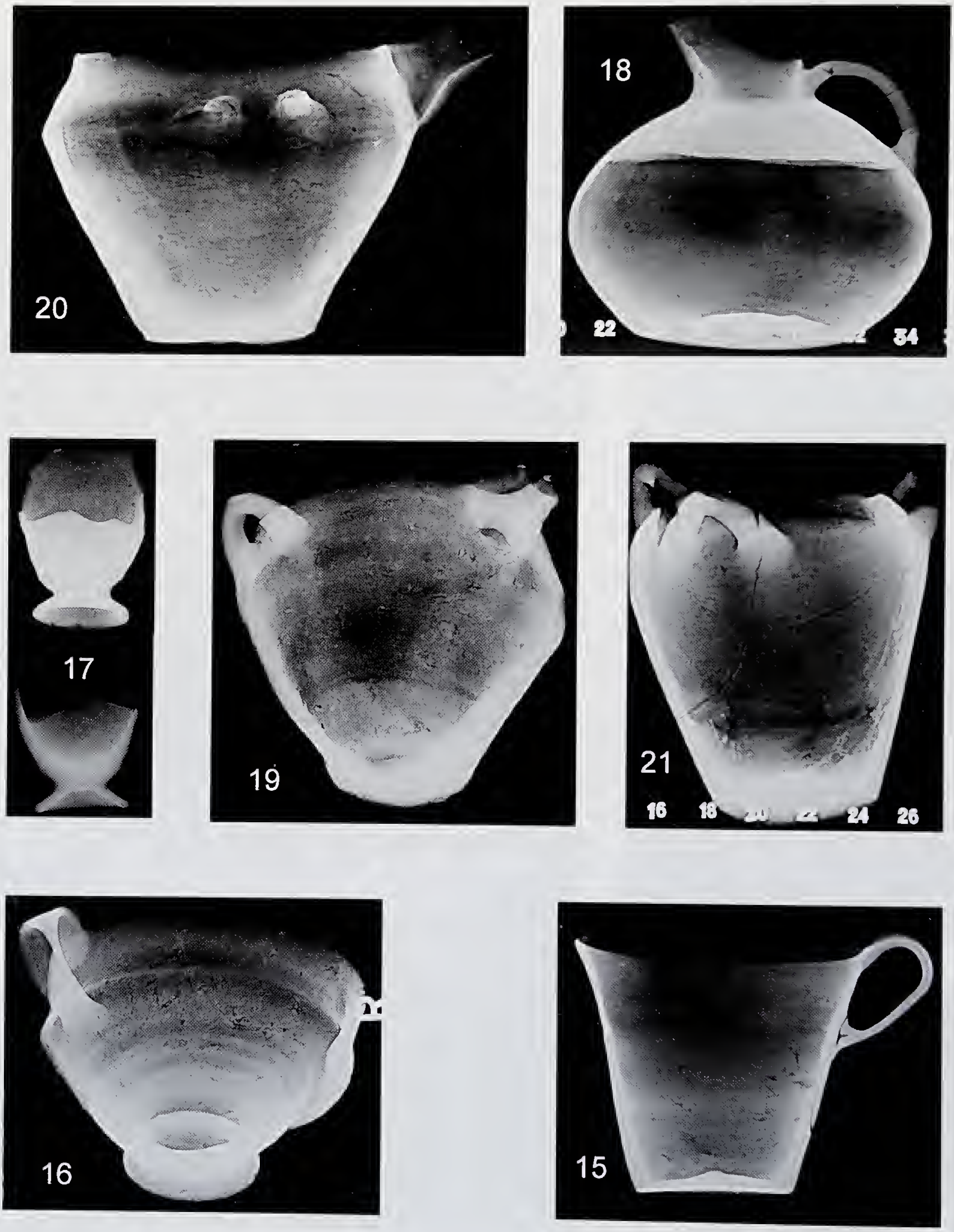

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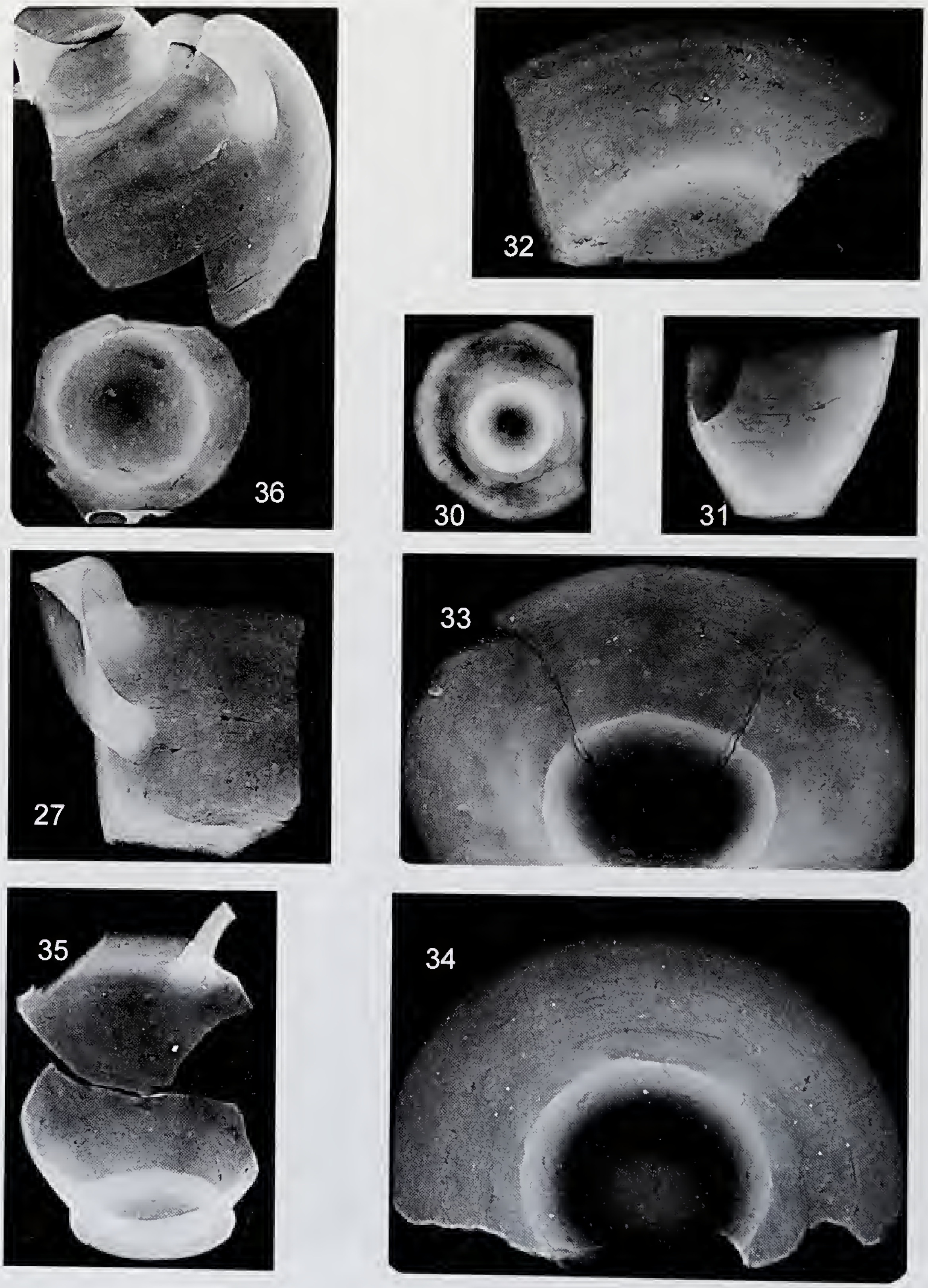

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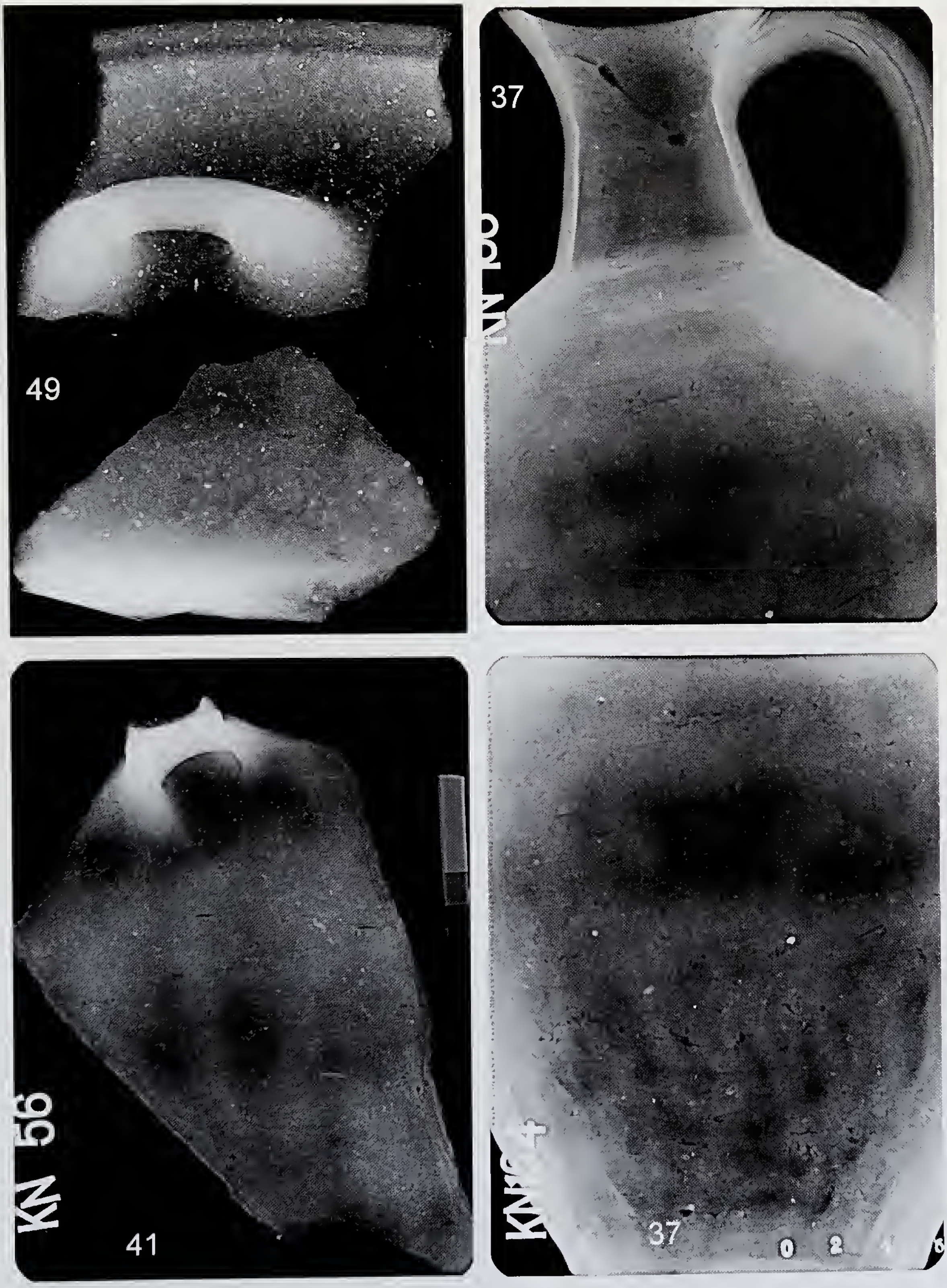
Enhanced radiographs of catalogued MM II A vessels (27, 30–36).



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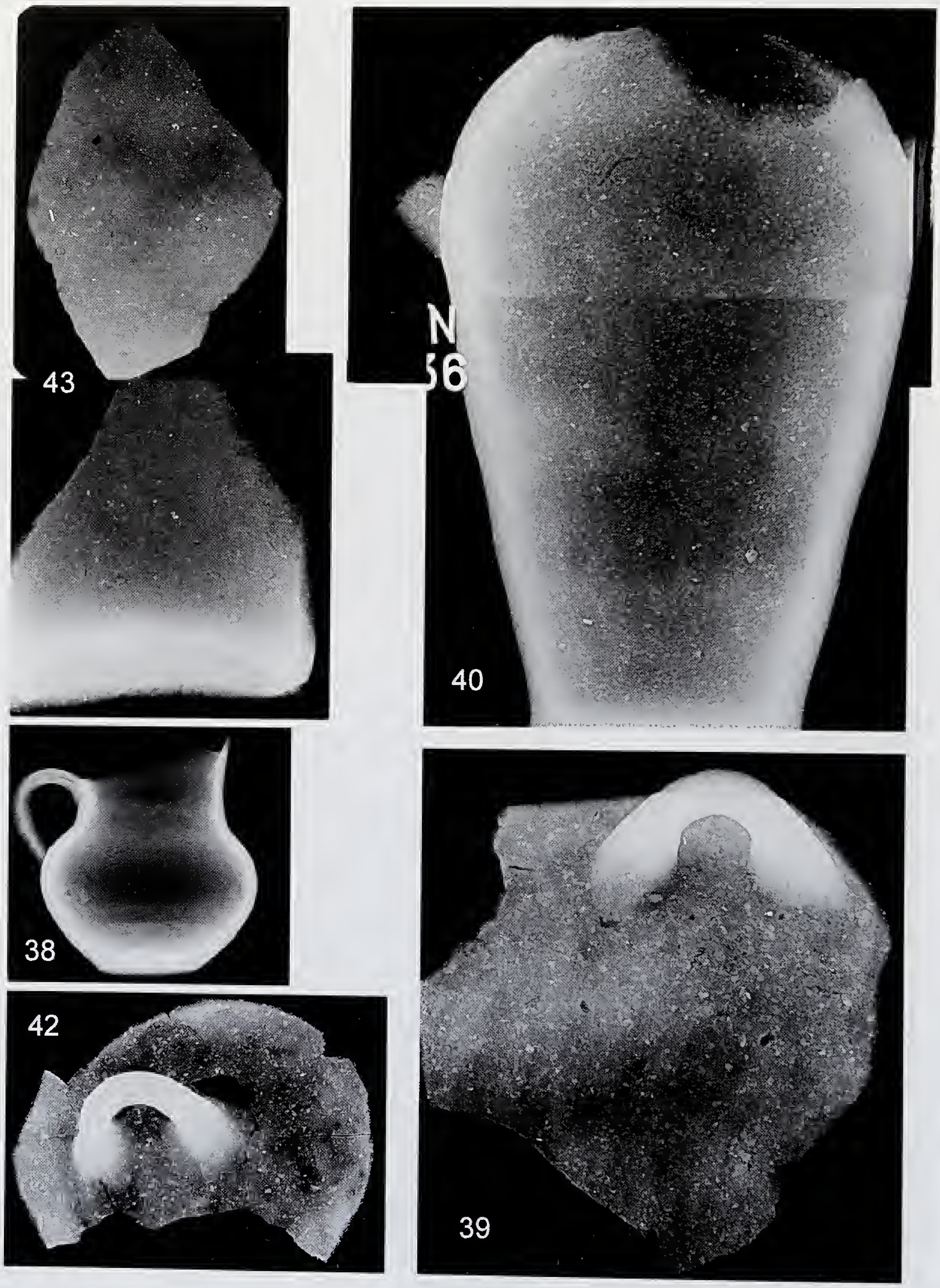

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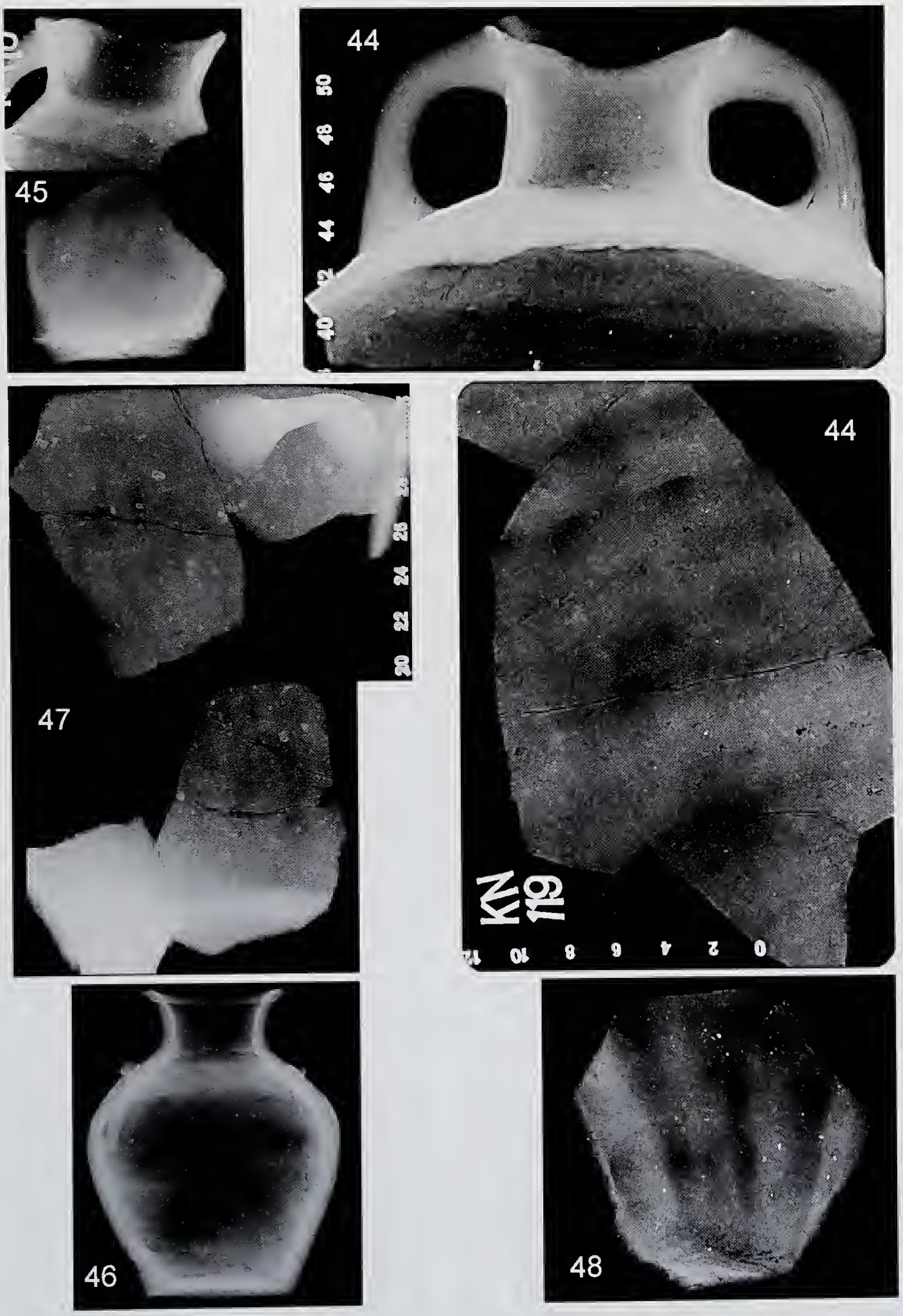

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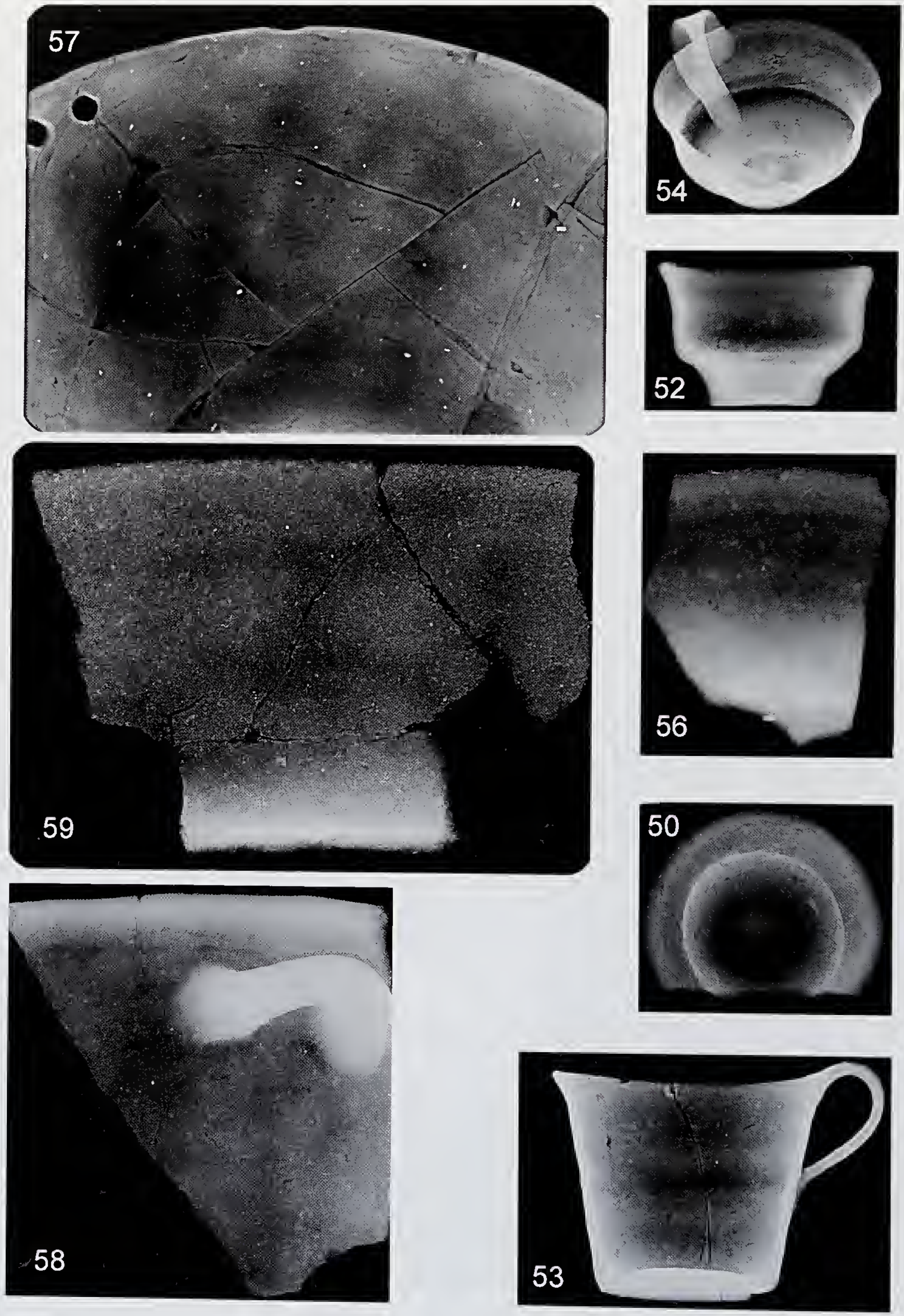

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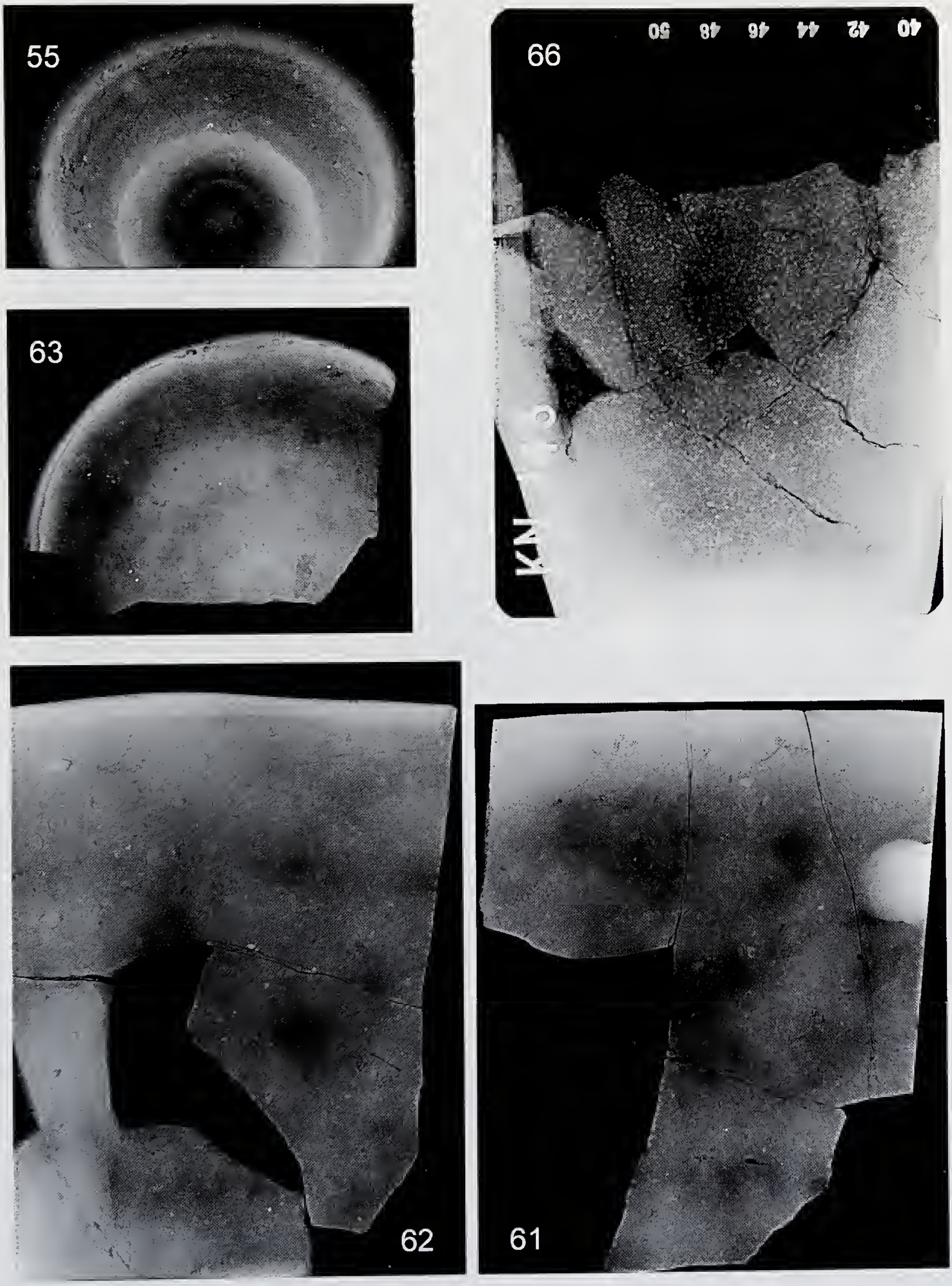

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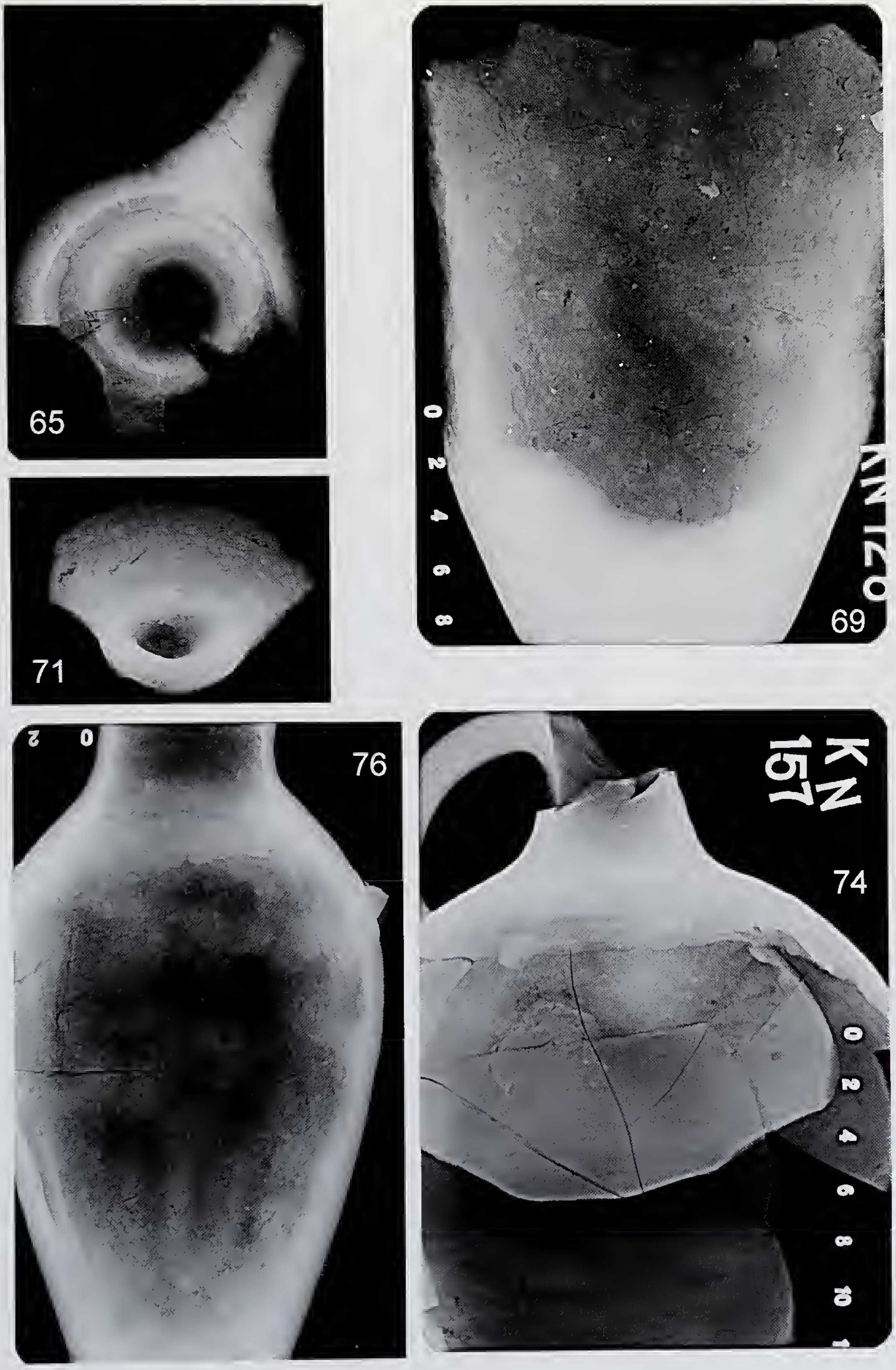

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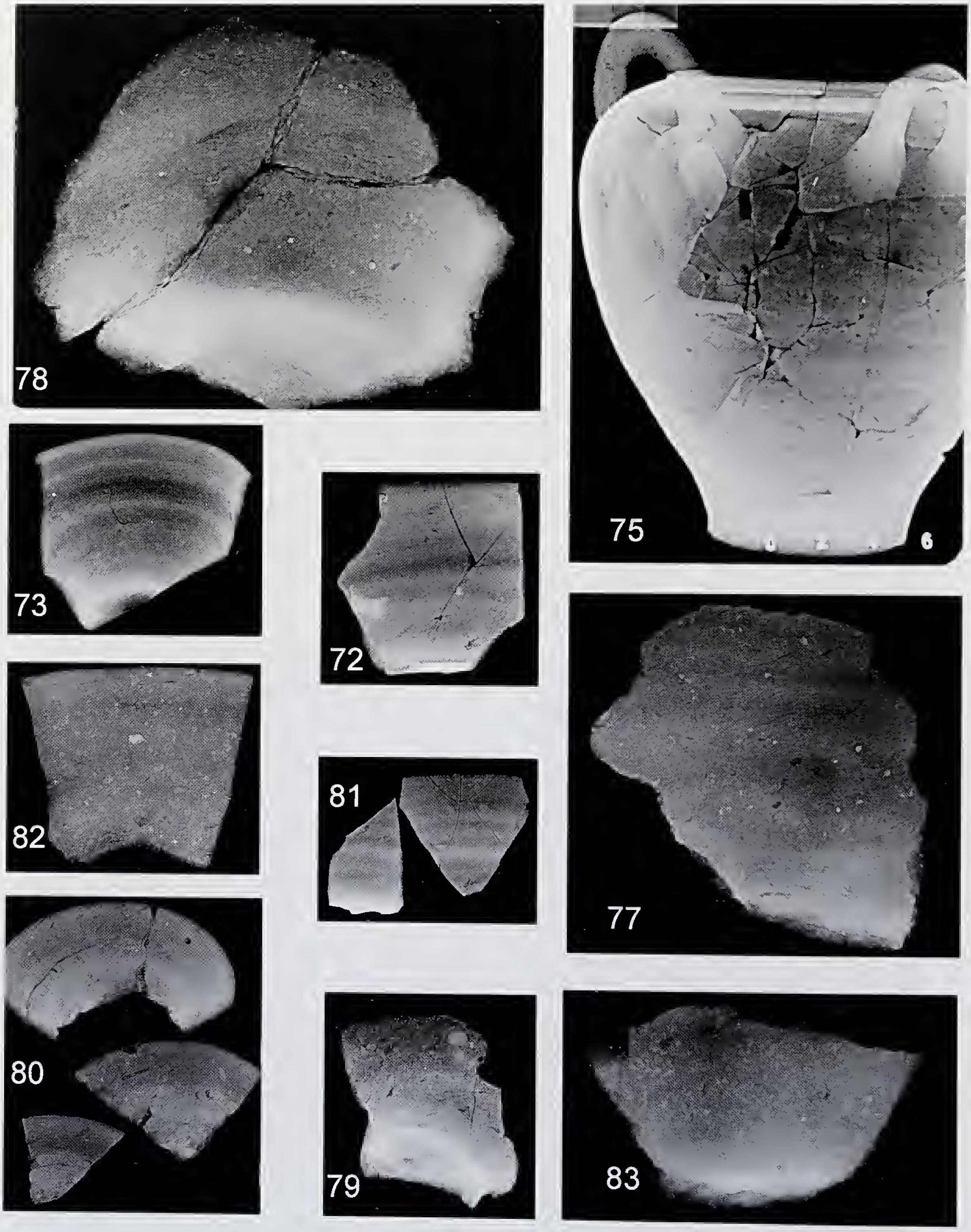

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X-RADIOLOGY OF KNOSSIAN BRONZE AGE VESSELS

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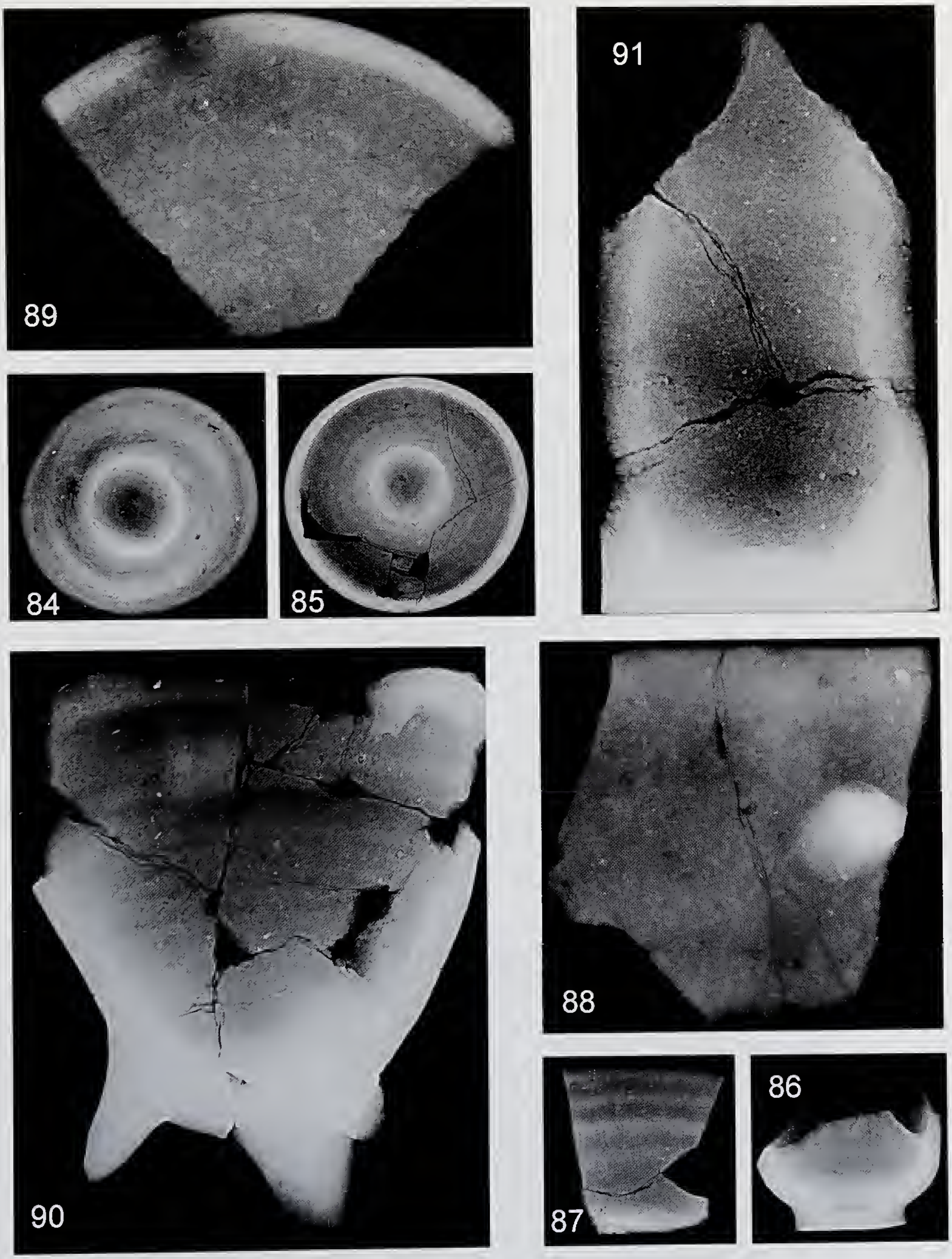

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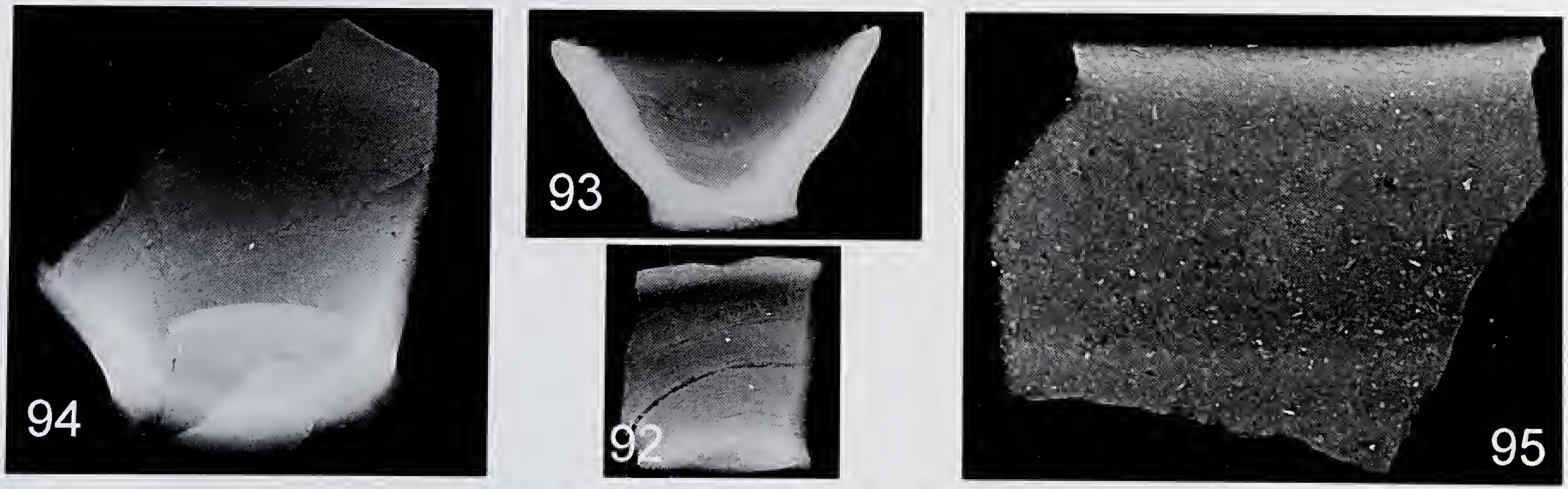

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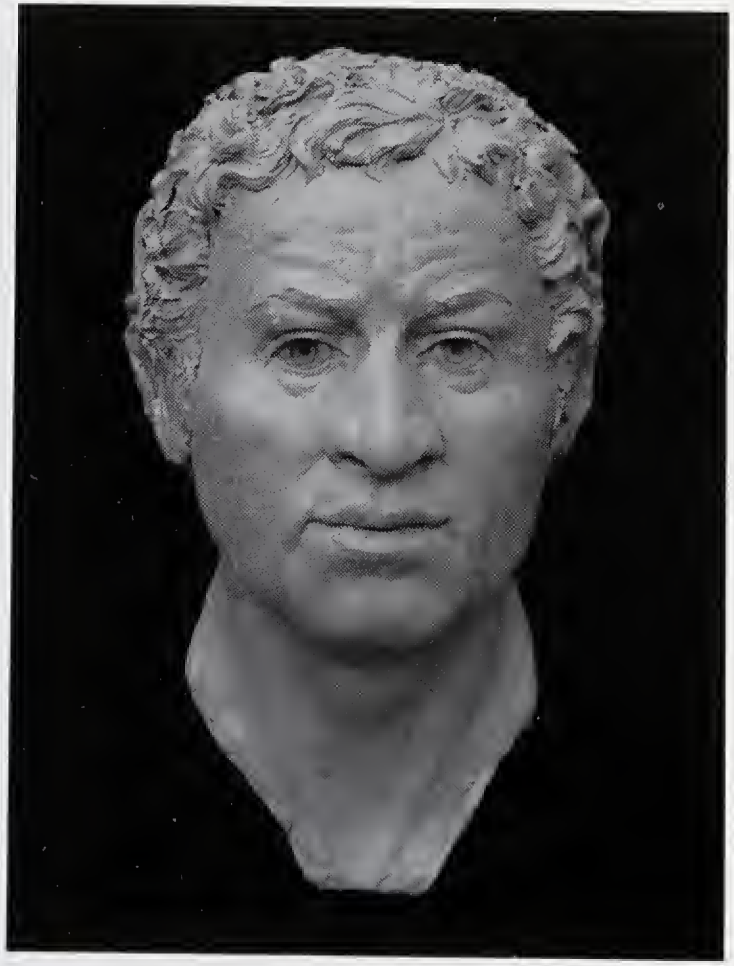

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